

PROGRAMMABLE CONTROLLER
MEWNET-F
(Remote I/O system)
Technical Manual

Safety Precautions

Observe the following notices to ensure personal safety or to prevent accidents.
To ensure that you use this product correctly, read this User's Manual thoroughly before use.
Make sure that you fully understand the product and information on safety.
This manual uses two safety flags to indicate different levels of danger.

WARNING

If critical situations that could lead to user's death or serious injury is assumed by mishandling of the product.

- Always take precautions to ensure the overall safety of your system, so that the whole system remains safe in the event of failure of this product or other external factor.
- Do not use this product in areas with inflammable gas. It could lead to an explosion.
- Exposing this product to excessive heat or open flames could cause damage to the lithium battery or other electronic parts.

CAUTION

If critical situations that could lead to user's injury or only property damage is assumed by mishandling of the product.

- To prevent excessive exothermic heat or smoke generation, use this product at the values less than the maximum of the characteristics and performance that are assured in these specifications.
- Do not dismantle or remodel the product. It could cause excessive exothermic heat or smoke generation.
- Do not touch the terminal while turning on electricity. It could lead to an electric shock.
- Use the external devices to function the emergency stop and interlock circuit.
- Connect the wires or connectors securely.
The loose connection could cause excessive exothermic heat or smoke generation.
- Do not allow foreign matters such as liquid, flammable materials, metals to go into the inside of the product. It could cause excessive exothermic heat or smoke generation.
- Do not undertake construction (such as connection and disconnection) while the power supply is on. It could lead to an electric shock.

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Record of Changes

Before You Start

CPU unit

MEWNET-F can be used by the combination of the CPU unit of FP3 and the following remote I/O master unit.

As for FP3, use the CPU unit of Ver. 2.0 or later.

The remote I/O control is not available with the CPU unit of a version older than Ver. 2.0.

CPU unit	Remote I/O master unit
FP2/FP2SH	For FP2 (AFP2720)
FP3 Ver. 2.0 or later	For FP3 (AFP3742)
FP10SH	For FP3 (AFP3742)

Number of connected slave stations

- A maximum of 32 slave stations can be connected to one master unit. The total number of occupied I/O points of slave stations should be up to the number of I/O points that each master unit can use.
- When using slave units, note that the number of units may be limited due to the restriction on number of slots.

I/O to be used

- The I/O to be used for the slave stations of MEWNET-F is automatically allocated according to the order in which master units are installed or slave station number.
- I/O numbers in the following ranges are allocated at the factory setting.

Master in network	No. of points	I/O No.
First master unit	512 points	640 to 95F
Second master unit	256 points	960 to 111F
Third master unit	128 points	1120 to 119F
Fourth master unit	128 points	1200 to 127F

- More number of points can be used on MEWNET-F by changing the factory setting. Tool software is required to change the setting. For changing the setting, specify in the following ranges.
 1. Up to 4096 points of I/O can be used for one master unit.
 - In case of the CPU unit of FP2/FP3, up to 2048 points can be used.
 - In case of FP3 master unit Ver. 1.4 or older, up to 1024 points can be used.
 2. Numbers that exceed the maximum number of controllable I/O points of CPU unit cannot be set.
 - I/O can be allocated by changing the setting regardless of slave station numbers or order in which units are installed. Tool software is required to change the setting.

Slave unit

- There are differences between FP2 slave I/O unit and FP3 slave I/O unit.
Especially, confirm thoroughly when replacing FP3/FP10SH system.

1. FP2 slave I/O unit should be installed in the installation position for a CPU unit on the backplane as well as FP3 slave I/O unit.

If it is installed in the installation position for an I/O unit, it may be damaged due to electric stress.



Reference: <1.2 System Configuration>

2. There are advanced units which cannot be used for the slave station system.



Reference: <1.2.3 Advanced Units Not to be Used for Slave Station System of "MEWNET-F">

Chapter 1

Functions and Restrictions of the Unit

1.1 Features and Functions

FP-series remote I/O system "MEWNET-F" is an I/O control network that supports the following features.

I/O remote control with FP2/FP3

I/O information (On/Off information of contacts) can be exchanged between a CPU unit (master station) and an I/O terminal (slave station) at a remote location. A 2-conductor communication cable is used for the connection.

High-speed, long-distance communication of I/O information

The system can support for a total communication distance of up to 700 m (*) at a baud rate of 0.5 Mbps.

* This is the distance guaranteed when using a twisted pair cable.

I/O control capacity of up to 4096 points

The master unit can accommodate up to 32 slave stations, or 4096 I/O points. FP3 master unit has two ports which can handle 4 communication paths, and FP2 multi-wire link unit has one port which can handle 2 communication paths. I/O decentralized/centralized control system can be easily established.



Note: Maximum number of points varies according to the combination of CPU unit and master unit.



Reference: For the information on the types and combinations of units,
<Chapter 3 Unit Specifications>

A wide variety of I/O units and boards can be used

On the slave station, you can install I/O units for the FP3 by using the slave stations. You can also use FP I/O terminal boards and FP I/O terminal units to increase the number of I/O points as necessary for each slave station. When you use an I/O link unit, you can exchange I/O information with an FP0, FP1 or FP-M.

* When using manifold solenoid valves for MEWNET-F made by various manufacturers, the direct control of valves is achievable.

Effectively deals with errors such as a disconnection of the communication cable

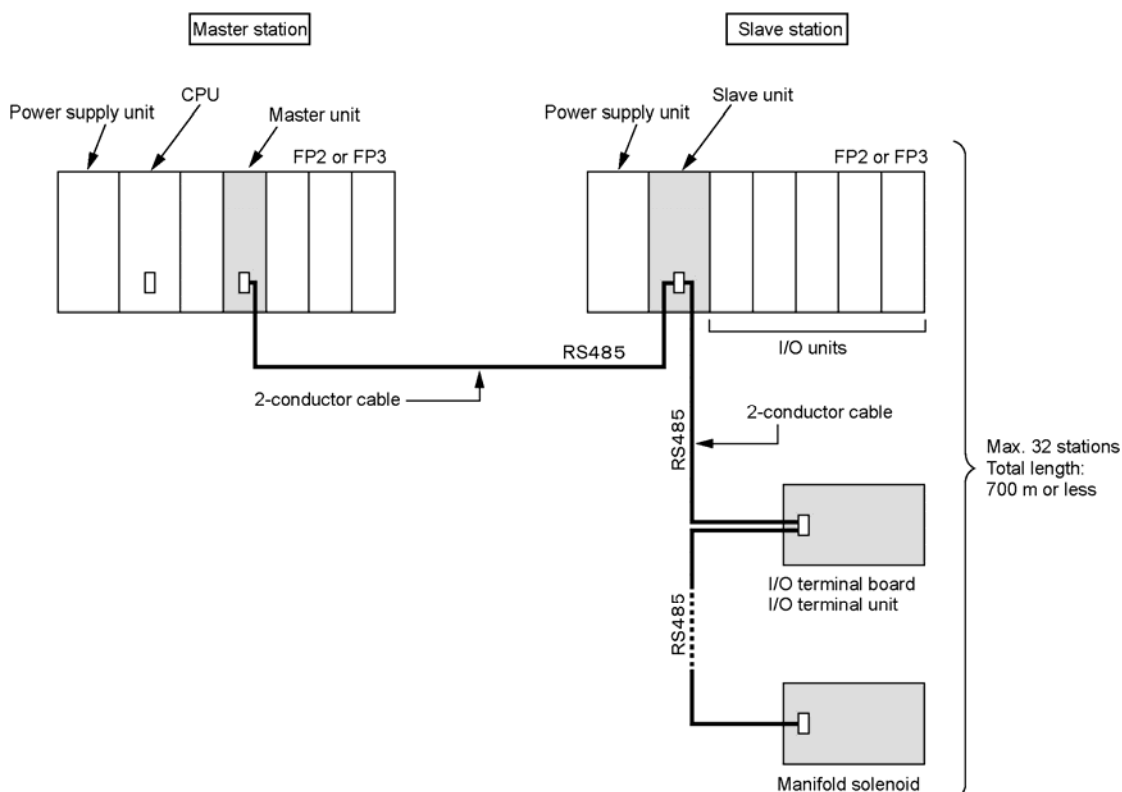
In "Slave station connection confirmation mode", it waits for executing the I/O control until all the registered slave stations are connected. This operation prevents malfunctions to be occurred by the delay in turning on the power supply of slave stations or cable disconnection. It is also possible to select "Output status maintain function" that is used to hold the output of slave stations even if the transmission cable was disconnected in operation.

1.2 System Configuration

The remote I/O system [MEWNET-F] is a network which can be configured with master stations (CPU unit + master unit) and slave stations (slave unit + I/O unit or various remote I/O exclusive I/O terminal) with transmission cables (two-wire cable). The CPU unit of master station controls the I/O (remote I/O) slave stations via the master unit.

*You can connect various kinds of slave stations on a single communication path from a master unit.

For example, the FP2 master unit can be connected to an FP3 slave unit and I/O terminal unit.



Configuration requirements

No. of installed master units per CPU unit	Max. 4 units
No. of slave stations per master unit	Max. 32 stations
No. of controllable I/O points per master unit ^{Note1)}	Max. 4096 points
No. of controllable slots per CPU unit	Max. 128 slots
No. of controllable slots per master unit	Max. 64 slots
Transmission cable (Two-wire cable)	VCTF 0.75 mm ² x 2C (JIS) or equivalent
Total transmission distance per port ^{Note2)}	Max. 700 m

Note1) It varies according to the number of maximum controllable I/O points of CPU unit.

Note2) The transmission distance varies according to the used cable and type of unit.



Reference: For the information on the types and combinations of units,
<Chapter 3 Unit Specifications>

1.2.1 Master Station (Master Unit)

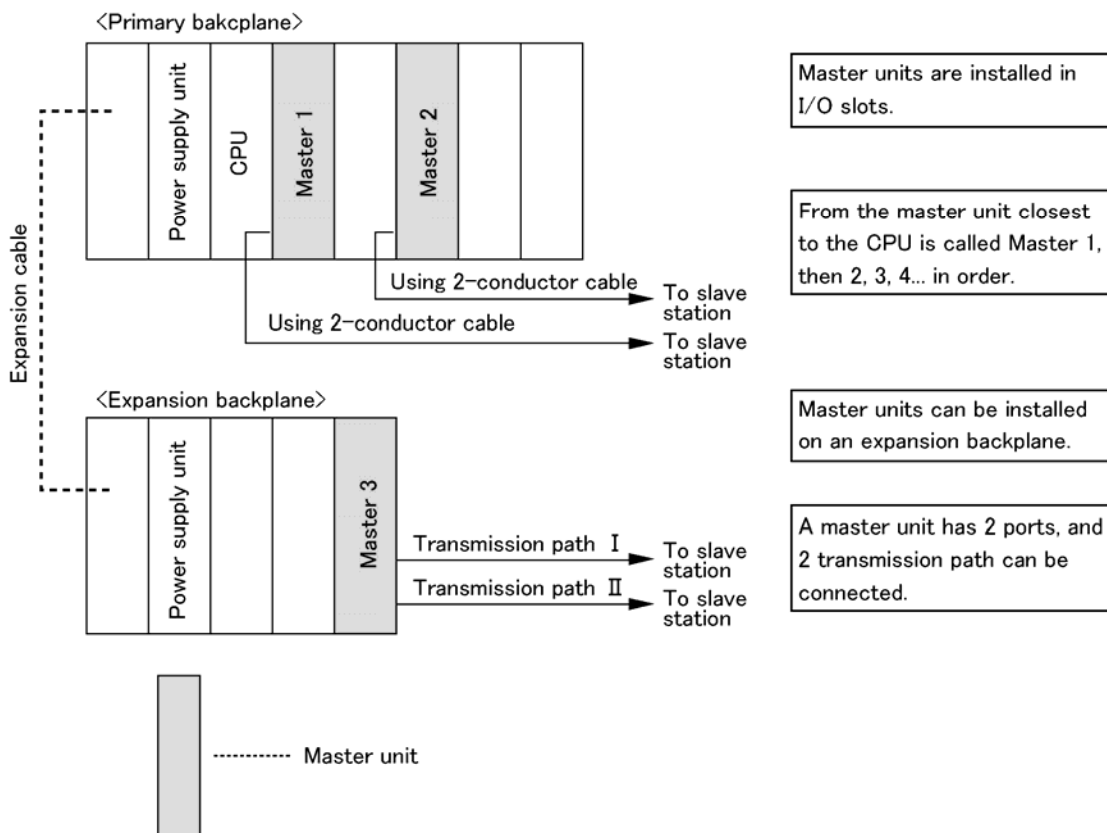
The master unit is a unit having a function to transmit the I/O information of the CPU unit to slave stations. **The master station** of the remote I/O system [MEWNET-F] is configured with this master unit and the CPU unit.

-Up to 4 nits can be installed to one CPU unit.

-The master unit is installed in the I/O slot of master backplane or expansion backplane.

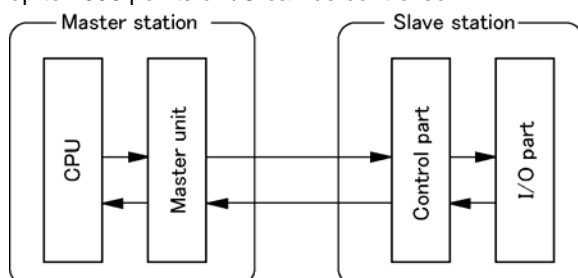
-It occupies 16 points of I/O points. (Specify 16SE on the editing software FPWIN GR.)

* When using the editing software FPWIN GR, the number of occupied I/O points can be set to 0 (0SE).



1.2.2 Slave Stations (Slave Unit, I/O Terminal, I/O Terminal Board, etc)

The I/O that is controlled by the master station (CPU unit and master unit) on the remote I/O system [MEWNET-F] is called **slave stations**. A maximum of 32 stations can be connected per master unit, and up to 4096 points of I/O can be controlled.



- Slave stations can be mixed. The FP3 system or exclusive I/O terminals are also controlled as slave stations. There is no restriction on the order of connection and the composition ratio.

- **Station numbers** are set to each slave station. **I/O numbers** are allocated in the order of station numbers. It is not necessary to set station numbers according to the order from the unit closer to the master unit. Also, it is no problem there are blanks.

Overview of slave stations

-FP2/FP3 system (Slave station system)

This is the system with a slave unit installed in the CPU slot of the master backplane instead of a CPU unit as "Slave station control part" shown above. (Note1, Note3) An advanced unit (Note2) can be used as "I/O part" as well as I/O unit.

"Shared memory access function" is also available.

Note1) I/O can be added by connecting expansion backplane as well as the standard system. Up to 3 backplanes including a master backplane can be added.

Up to 8 slots can be used to install expansion units on expansion backplane.

Each length of expansion cables should not be longer than 1 m each for FP3, and 2.6 m totally for FP2.

Note2) There are some advanced units which cannot be used for the slave station system.



Reference: <1.2.3 Advanced Units Not to be Used for Slave Station System of "MEWNET-F">
<6.3.2 Setting the Number of Slots Used>

Note3) The system cannot be controlled only by the slave unit without a master station.

-FP I/O Terminal Unit

As the [MEWNET-F] FP terminals, there are an I/O terminal board that the input and output are combined and an I/O terminal unit (Note) that the input and output are separate. The "Slave station control part" and "I/O part" shown in the above figure is contained in a single unit.

Note) There are an input unit and output unit for the I/O terminal unit. Also, number of controllable points can be increased or the input and output can be combined by connecting expansion units.

-FP0/FP1/FP-M & I/O Link Unit

The connection to the [MEWNET-F] network can be established by connecting the I/O link unit to FP0/FP1/FP-M. The I/O of FP0/FP1/FP-M cannot be directly controlled by the master station, however, the I/O link area input of FP0/FP1/FP-M can be controlled with FP3 programs, or the remote I/O area input of FP3 can be controlled with FP0/FP1/FP-M programs.



Reference: <Chapter 11, Chapter 12 (Appendix) I/O Link>

-MEWNET-F-compatible devices

As the above "Slave station control part" and "I/O part" is contained in these devices, they can be directly controlled by the master station.

Manifold solenoid valves made by various manufacturers are available. Refer to respective manuals of each device.

Note) The manifold solenoid valves compatible with our MEWNET-F are marketed by SMC Corporation, CKD Corporation and Koganei Corporation. For the detailed information, please contact each companies.

1.2.3 Advanced Units Not to be Used for Slave Station System of “MEWNET-F”

The following advanced units cannot be used even if they are installed on the master backplane and the expansion backplane where the slave unit has been installed.

If they are installed, an error that an illegal unit is installed on the slave station occurs, and the CPU unit does not operate. The ALARM LEDs of the master unit and slave unit blink.

Note) No error occurs on FP2 A/D unit, D/A unit and RTD unit.

Unusable units

FP3	Master Unit MEWNET-P/W/H Link Unit ET-LAN Unit Computer Communication Unit (CCU) C-NET Link Unit S-LINK Unit Interrupt Unit
FP2	Multi-wire Link Unit MEWNET-VE Link Unit ET-LAN Unit Computer Communication Unit (CCU) Multi Communication Unit A/D Unit (No error occurs) D/A Unit (No error occurs) RTD Unit (No error occurs) Positioning Unit RTE Positioning Unit Interpolation type Positioning Unit Multifunction type

Usable units when setting to the mode no interrupt occur

FP3	High-speed Counter Unit, Pulse Output Unit
FP2	High-speed Counter Unit, Pulse Output Unit

When using a positioning unit for FP2 slave station system

If the time taken from the start-up to the completion of positioning operation is shorter than the scan time, flags such as the output end flag and pulse output flag may not be read and an error may occur.

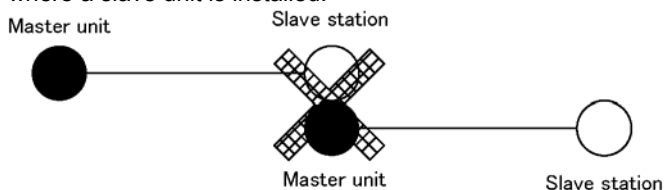
The time from the start-up to the completion of positioning operation must be longer than the scan time.

When using a S-LINK unit for FP2 slave station system

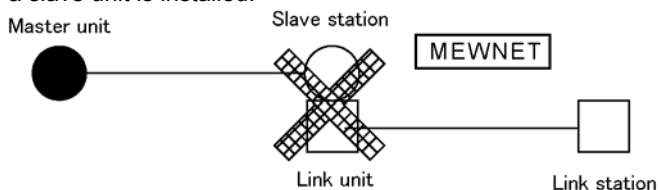
The settings of I/O points including 96 input points and 96 output points cannot be used.

The following systems cannot be configured.

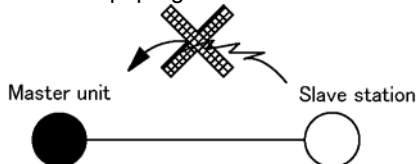
A remote I/O system cannot be configured with a master unit installed in the I/O slot of the backplane where a slave unit is installed.



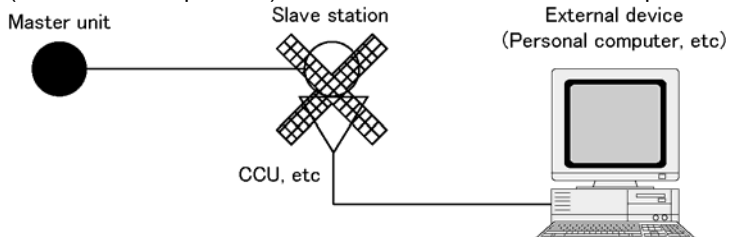
A MEWNET network cannot be configured with a link unit installed in the I/O slot of the backplane where a slave unit is installed.



The interrupt program cannot be executed from the slave stations.



Communication with external devices cannot be achieved with a communication unit using MEWTOCOL (communication protocol) installed in the I/O slot of the backplane where a slave unit is installed.



1.3 Unit Types

1.3.1 Remote I/O System "MEWNET-F" Components


Name		Specifications			I/O allocation	Model No.	
Master station	FP2 Multi-wire Link Unit	A master station is configured with the CPU unit of FP2, FP2SH, and controlslave stations.			16SE ^{Note4)}	AFP2720	
	FP3 Remote I/O Master Unit	A master station is configured with the CPU unit of FP3 FP10, and controlslave stations.			16SE ^{Note4)}	AFP3742	
Slave station	FP2 Remote I/O Slave Unit	This unit is used for decentralized allocation of I/O using the FP2 system as a slave station. It is controlled by the master unit.			———	AFP2745	
	FP3 Remote I/O Slave Unit	This unit is used for decentralized allocation of I/O using the FP3 system as a slave station. It is controlled by the master unit.			———	AFP3745	
	FP I/O terminal baord [MIL connector type] ^{Note1)}	12 V DC input/ 0.2 A Tr output	16-point input, 16-point output		16X16Y	AFP87445	
		24 V DC input/ 0.2 A Tr output	16-point input, 16-point output		16X16Y	AFP87446	
	FP I/O terminal board [Terminal block type]	24 V DC input/ 0.2 A Tr output	16-point input, 16-point output		16X16Y	AFP87444	
		24 V DC input/ 2 A Ry. output	16-point input, 8-point output		16X16Y	AFP87432	
	FP I/O Terminal Unit	Controlled as a slave station. Up to 32 points can be added. (Operating voltage: 24 V DC)	FP I/O Terminal Unit (Basic)	Input unit 24 V DC input	8-point input	16X	AFP87421
					16-point input	16X	AFP87422
				Output unit 0.5 A Tr. output	8-point output	16Y	AFP87423
					16-point output	16Y	AFP87424
			FP I/O Terminal Expansion Unit ^{Note2)}	Input unit 24 V DC input	8-point input	16X	AFP87425
					16-point input	16X	AFP87426
				Output unit 0.5 A Tr. output	8-point output	16Y	AFP87427
					16-point output	16Y	AFP87428
	FP1 I/O Link Unit	Combined with FP1, and exchanges contact information with the master station (FP2, FP2SH, FP3, FP10SH). ^{Note3)}	Power supply voltage: 24 V DC		32X32Y	AFP1732	
Power supply voltage: 100 V AC to 240 V AC			32X32Y	AFP1736			
FP0 I/O Link Unit	Combined with FP0 and exchanges contact information with the master station (FP2, FP2SH, FP3, FP10SH).	Power supply voltage: 24 V DC		32X32Y	AFP0732		
	FP-M I/O link board	Combined with FP-M, and exchanges contact information with the master station (FP2, FP2SH, FP3, FP10SH).	Power supply voltage: 12 V DC		32X32Y	AFC1731	
			Power supply voltage: 24 V DC		32X32Y	AFC1732	

Note1) Power supply cable (1 m in length) APL9511 x 1 pc is supplied.

Note2) PL Mark II expansion cable (8 cm in length) APL2510 x 1 pc is supplied.

Note3) FP1 expansion cable (7 cm in length) AFP1510 x 1 pc is supplied.

Note4) When using the editing software FPWIN GR, the number of occupied I/O points can be set to 0 (0SE).

1. CPU units that can use the MEWNET-F system are as follows.
- FP2, FP2SH, FP3 (Ver. 2.0 or later), FP10SH
 2. The value of I/O map allocation is the number of occupied I/O points of each unit that is set when allocating I/O numbers using the editing software. In case of the MEWNET-F system, it can be treated as a remote I/O map separately from the normal I/O map. (Refer to "10. Remote I/O map".)
-  **Reference:** <Chapter 6 Remote I/O Map>
3. When the FP I/O terminal unit is installed, the allocated values of the I/O map vary according to the combination of expansion units. Please note the followings; Input + Input: 32X, Output + Output: 32Y, Input + Output or Output + Input: 16X16Y (Common to 8-point unit and 16-point unit)

1.3.2 Transmission Cable

A two-wire cable is used for the transmission cable.

Name	Specifications
Two-wire cable	VCTF 0.75 mm ² x 2C (JIS) or equivalent
Terminal	Crimp terminals (Ring terminal, insulated ring terminal, fork terminal)

1.3.3 I/O Cables and Power Supply Cable for I/O Terminal Board "For MIL Connector Type"

The following I/O cables are applicable for the I/O terminal board {MIL connector type}. A power supply cable is supplied with the I/O terminal board [MIL connector type].

Name	Cable length	Specifications	Model No.
I/O cable (with one-sided connector)	1 m	30-pin For input terminal	AFB8521
		34-pin For output terminal	AFB8531
	2 m	30-pin For input terminal	AFB8522
		34-pin For output terminal	AFB8532
	3 m	30-pin For input terminal	AFB8523
		34-pin For output terminal	AFB8533
	4 m	30-pin For input terminal	AFB8524
		34-pin For output terminal	AFB8534
Power supply cable	1 m	Standard accessory for AFP287445 and AFP87446	APL9511

1.3.4 Expansion Cable for I/O Terminal Unit

The following cables are used to connect an expansion unit to the standard I/O terminal unit. A 8 cm long cable is attached to an expansion unit as a standard accessory.

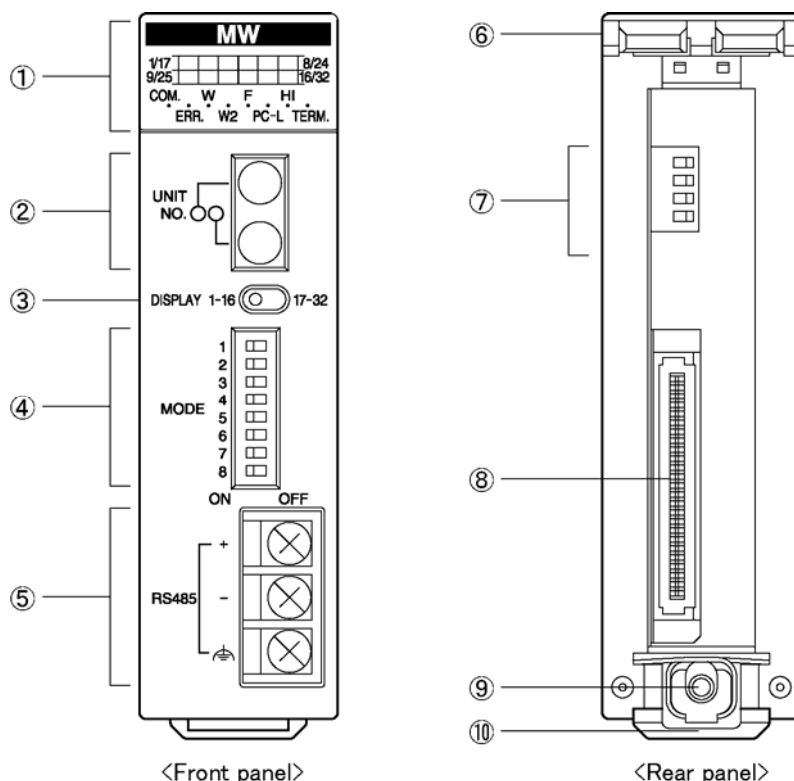
Name	Cable length	Product No.	Remarks
PL Mark II expansion cable	8 cm	APL2510	Standard accessory for AFP87425 and AFP87428
	28 cm	APL2511	
	48 cm	APL2515	

Chapter 2

Part Names and Functions

2.1 FP2 Multi-wire Link Unit

FP2 Multi-wire Link Unit (AFP2720)



Part Names and Functions

(1) Operation monitor LEDs

Indicates communication status and operation mode, such as run/stop, error/alarm..

(2) Station number selector

Sets the unit No. of the master unit in the network. (It is used in the W/W2 mode only.)

In the W mode, the setting will be effective as soon as a unit number is changed. In the W2 mode, unit numbers should be changed when the power supply is off. The setting will be effective next time the power turns on.

(3) Station number selector

Switches the display range of the station number LEDs. (It is used in the F mode only.)

(4) Mode selector switches (1)

Sets the operation mode (PC link mode, non-PC link mode, terminal station).

The setting of the mode selector switches should be changed when the power supply is off. The setting will be effective next time the power turns on. (The setting for the terminal station will be effective as soon as a unit number is changed.)

(5)RS485 interface

For connecting the communication cables.

(6)Fixing hooks

For installing the unit on the backplane for FP2.

(7)Mode selector switches (2)

Sets the operation mode (W/W2/F mode, baud rate).

The setting of the mode selector switches should be changed when the power supply is off. The setting will be effective next time the power turns on.

(8)Connector for connecting to a backplane

Connects the unit to a slot on the backplane for FP2.

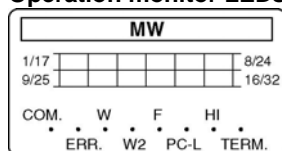
(9)Mounting screw

For attaching the unit to the backplane.

(10)Temporary joint hook

For attaching the unit to the backplane temporarily.

Operation monitor LEDs



○ :Lights: ● :Flashing (T = 0.2 s), ● :Flashing slowly (T = 1.0 s), ● :Goes out:

LED	Description	Operation		
		W mode	W2 mode	F mode
COM.	Communication status	○ :Communicating (Normal) ● :Communication error (Transmission is not available)	○ :Communicating (Normal) ● :Communication buffer Overload ● :Communication error (Transmission is not available)	○ :Waiting for communication ● :Communicating (Normal) ● :Stop mode Transmitting ● :Communication error
ERR.	Hardware/Software error	○ :Out of control/Self-diagnostic Error ● :Wait for starting error (Note1) ● :Various errors (Note2) ● :Normal operation	○ :Out of control/Self-diagnostic Error ● :Wait for starting error (Note1) ● :Various errors (Note2) ● :Normal operation	○ :Out of control/Self-diagnostic Error ● Setup error ● :Normal operation
W	W mode	○ :In W mode	● :Not in W mode	● :Not in W mode
W2	W2 mode	● :Not in W2 mode	○ :In W2 mode	● :Not in W2 mode
F	F mode	● :No in F mode	● :No in F mode	○ :In F mode
PC-L	PC link flag (Available in W/W2 mode only)	○ :PC link operation State ● :PC link stop/Non-PC link operation State	○ :PC link operation state ● :PC link Operation impossible ● :Non-PC link operation State	● :Not used
HI	Baud rate	○ :500 kbps fixed	○ :500 kbps ● :250 kbps	○ :500 kbps fixed
TERM.	Terminal station	○ :Terminal station	● :Not terminal station	
1/17~8/24 9/25~16/32	Slave station display (Available in F mode only)	● :Not used		○ :Connected ● :Not connected * Slave station numbers are switched by the slave station number selector.

Note1) It occurs when the version of CPU unit is Ver. 1.05 or older.

Note2) It occurs in case of transmission errors, when a station number is out of range, station numbers are duplicated, or allocated link areas are duplicated.

Station number selector

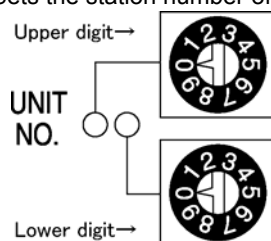
Switches the display range of the station number display. It is used in the F mode only.

DISPLAY 1-16  17-32

Item	Setting
1-16	Indicates the monitor LEDs between the slave station number 1 to 16.
17-32	Indicates the monitor LEDs between the slave station number 17 to 32.

Station number selector

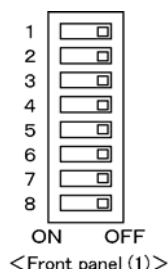
Sets the station number of the master unit in the W/W2 mode. It is not used in the F mode.



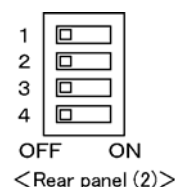
Point the arrow to the number to be used.

Operation	Setting
W mode	01 to 32: Available Other numbers: The station number setting error occurs. (Changing station numbers in operation is possible.)
W2 mode	01 to 64: Available Other numbers: The station number setting error occurs. (Changing station numbers in operation is possible.)

Mode selector switches



Setting	SW		Operation		
			W mode	W2 mode	F mode
Operation mode	1	OFF	PC link mode		The operation of the master unit stops when communication error occurs.
		ON	Non-PC link mode		The operation of the master unit continues when communication error occurs.
Not used	2	—	—		
	3	—	—		
	4	—	—		
	5	—	—		
	6	—	—		
Terminal station setting	7	7: ON, 8: ON	Terminal station		
	8	7: OFF, 8: OFF	Not terminal station		



The switches are all set to the OFF position at the factory.

			W mode	W2 mode	F mode
Operation mode	1		OFF	ON	ON
	2		OFF	OFF	ON
Baud rate Note2)	3	OFF	500 kbps fixed	500 kbps	500 kbps fixed
		ON		250 kbps	
—	4		Always set the switches to the OFF position.		

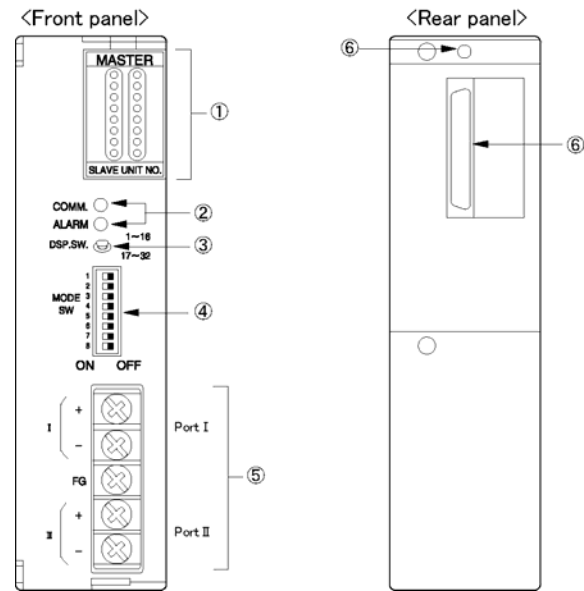
Note1) The setting of the mode selector switches is reflected in the operation monitor LEDs.

Note2) In the W2 mode, a unit at 500 kbps and a unit at 250 kbps cannot be mixed in the same network.

Note3) Be sure the power is off when changing the selector position (except the terminal station setting).

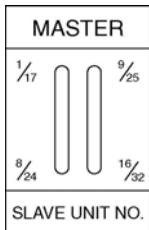
2.2 Remote I/O master unit

2.2.1 FP3 Remote I/O Master Unit (AFP3742)



Functions of each part

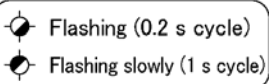
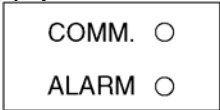
(1)Station number LEDs



The LEDs indicating the slave station numbers (No. 1 to No. 32) which are connected to the network light up. Check the lighting-up by switching the display range of the station number LEDs between number 1 to 16 and number 17 to 32 with "Station number selector".



(2)Operation monitor LEDs



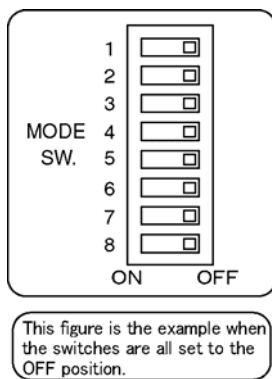
Indicates communication status and operation mode.

LED	Descriptions
COMM. (Communi- cation)	<ul style="list-style-type: none">○ (ON): Not communicating◐ (Flashing): Communicating (Normal)◑ (Flashing slowly): Communicating (Stop mode)● (OFF): Abnormal condition
ALARM (Alarm)	<ul style="list-style-type: none">○ (ON): Unit error◐ (Flashing): Station No. setting error, When an illegal unit is installed on the slave station● (OFF): Normal unit

(3)Station number selector

Switches the display range of teh station number LEDs. Refer to the description of "Station numbers LEDs" above.

(4)Mode selector switches For selecting the transmission line, setting the terminal station and selecting the mode when a tranmission error occurs.



SW	Setting	OFF	ON
1、2	Port selection	Port I	Port I and Port II
3、4	Terminal station setting (Port I)	Not terminal station	Terminal station
5、6	Terminal station setting (Port I)	Not terminal station	Terminal station
7	Condition during a communication error	Master Unit Stop the operation	Master Unit Continue the operation

* The settings of SW1 and SW2, SW3 and SW4, and SW5 and SW6 should be same.

* The swithces are all set to the OFF position at the factory.SW8 is not used.

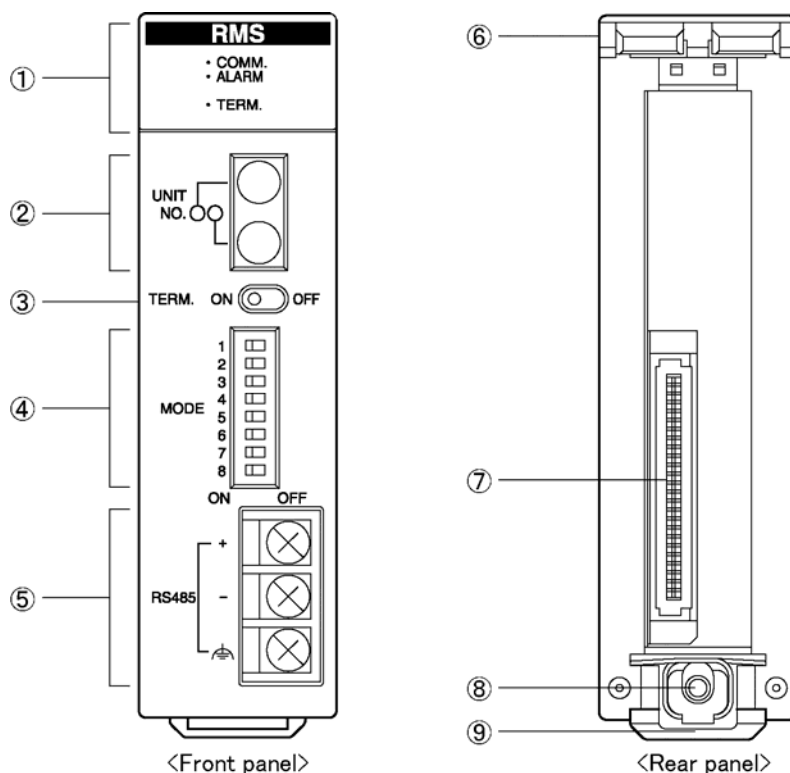
* The settings will be accepted when the power turns on.

⑤RS485 interface For connecting the communication cables.Two poarts are available.

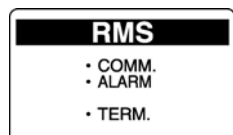
⑥Mounting screw Connects the master unit to a slot on the backplane.
Connector

2.3 Remote I/O Slave Unit

2.3.1 FP2 Remote I/O Slave Unit (AFP2745)



(1) Operation monitor LEDs



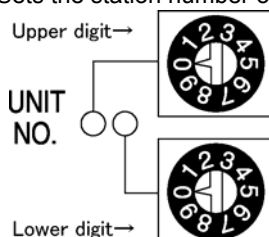
Name	Display
COMM.	Displays communication status. ○: Lights : Waiting ○: Lights : Communicating (Normal) ●: Flashing (T = 0.2 s), : Communicating (Stop mode) ●: Flashing slowly (T = 1.0 s), : Communication error ●: Goes out
ALARM	Indicates an error on the unit. ○: Lights : Unit error ●: Flashing quickly (T = 0.2 s), : Setting error ●: Goes out : Normal operation
TERM.	Indicates the setting of termination resistance. ○: Lights : Termination resistance is on. ●: Goes out : Termination resistance is off.

Switches

Note) Be sure the power is off when changing the switches.

(2) Station number selector

Sets the station number of the remote I/O slave unit.



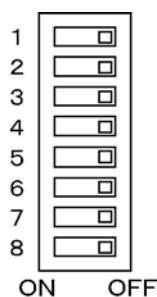
Setting
01 to 32: Available
Other numbers: The station number setting error occurs.
Note) Setting error: The ALARM LED blinks.

(3) Termination resistance selector switch

TERM. ON  OFF

ON	OFF
Termination resistance: ON	Termination resistance: OFF

(4) Mode selector switches



SW No.	Function	ON	OFF
1	Output condition during a communication error	Maintains its output condition	Output off
2	Not used	-	-
3	Not used	-	-
4	Not used	-	-
5	Not used	-	-
6	Not used	-	-
7	Not used	-	-
8	Not used	-	-

Note) Set the unused switches to the off position.

(5) RS485 interface

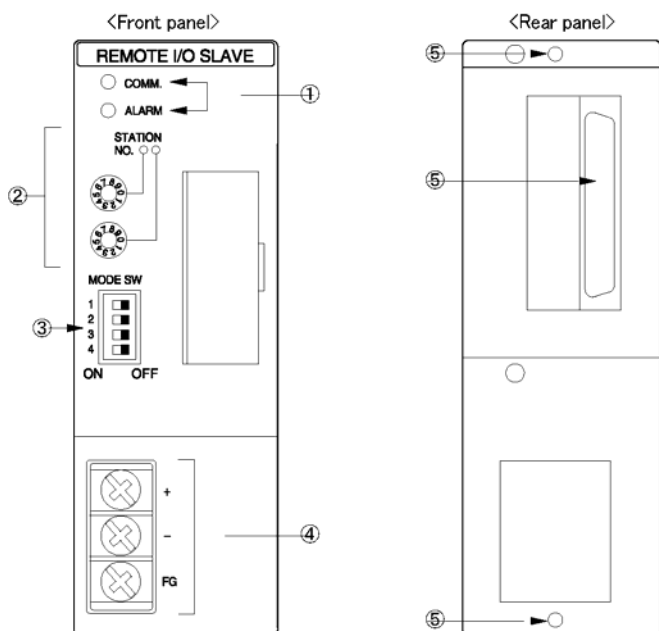
(6) Fixing hooks

(7) Connector for connecting to a backplane

(8) Mounting screw

(9) Temporary joint hook

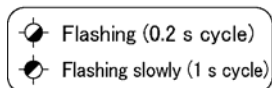
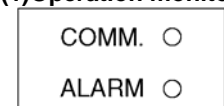
2.3.2 FP3 Remote I/O Slave Unit (AFP3745)



Functions of each part

(1) Operation monitor LEDs

Indicates communication status and operation mode.



LED	Descriptions
COMM. (Communication)	○ (ON): Not communicating
	◐ (Flashing): Communicating (Normal)
	◑ (Flashing slowly): Remote I/O control halted
	● (OFF): Abnormal condition
ALARM (Alarm)	○ (ON): Unit error
	◐ (Flashing): Station No. setting error, When an illegal unit is installed on the slave station
	● (OFF): Normal unit

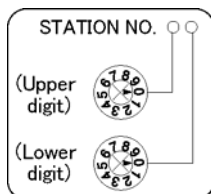
(2) Station number selector switches..

Set the station number of the MEWNET-F. Point the arrow to the number to be used. (Set tens place and ones place separately.)

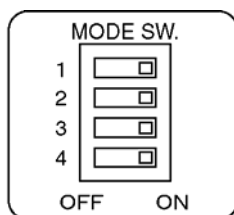
Setting range: 01 to 32

* When setting numbers exceeding the range, the setup error occurs (ALARM LED flashes), and communication becomes impossible.

* The settings will be accepted when the power turns on.



(3)Mode selector switches.... Sets the terminal station and the output mode a communication error occurs.



This figure is the example when the switches are all set to the OFF position.

SW	Setting	OFF	ON
1、2	Terminal station setting	Not terminal station	Terminal station
3	Output condition during a communication error	Output off	Maintains its output condition

* The settings of SW1 and SW2 should be the same.

* The swithces are all set to the OFF position at the factory.SW4 is not used.

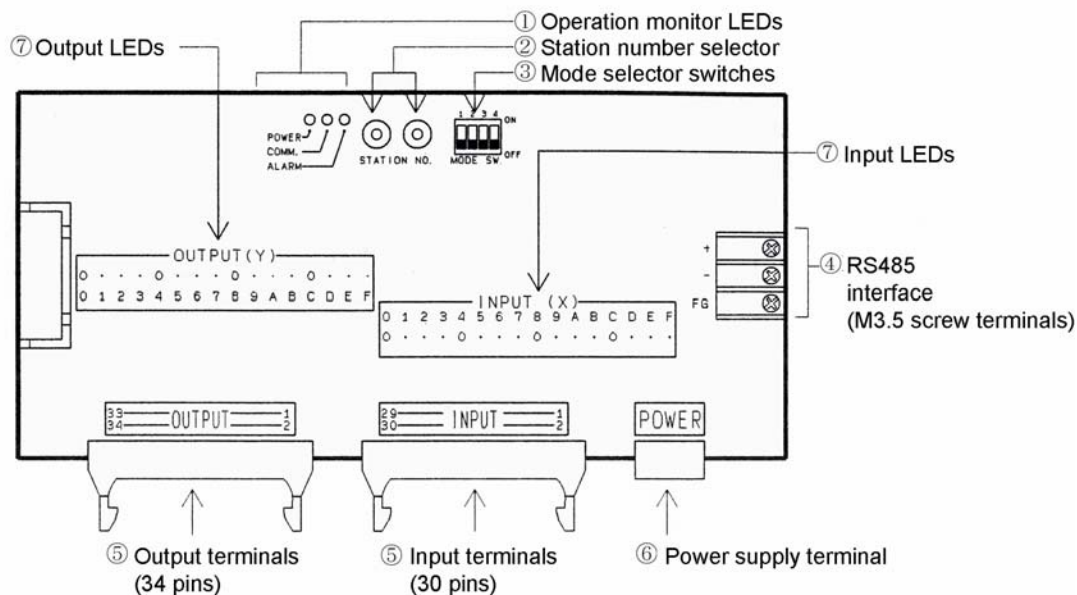
* The settings will be accepted when the power turns on.

(4)RS485 interface For connecting the communication cables.

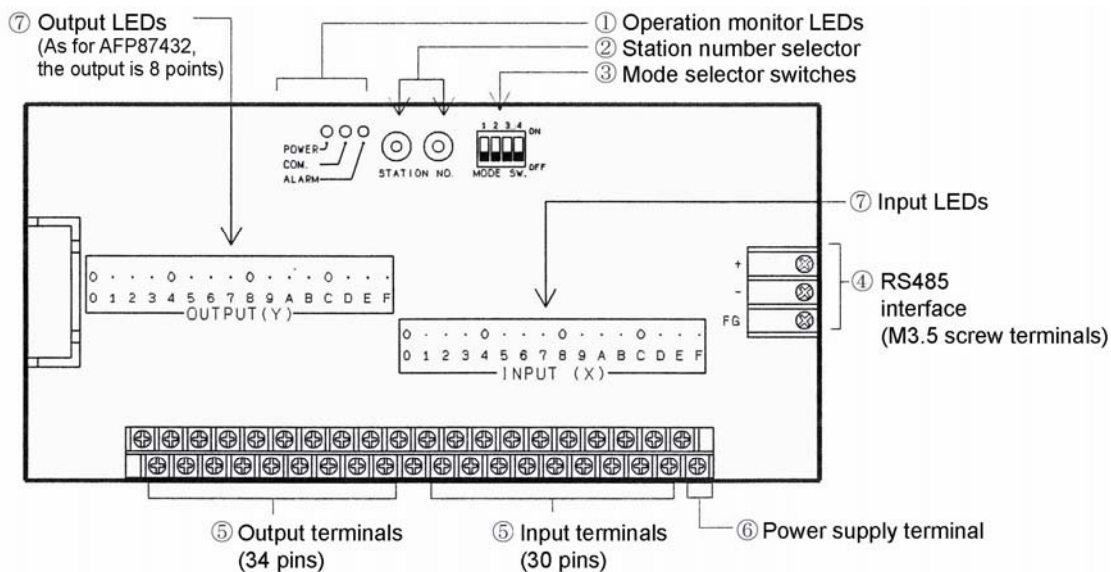
(5)Mounting screw Connects the slave unit to a CPU slot on the backplane.
Connector

2.4 I/O Terminal Board

FP I/O terminal board [MIL connector type]
(AFP87445, AFP87446)



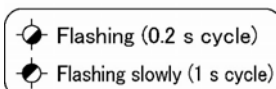
FP I/O terminal board [Terminal block type] (AFP87444, AFP87432)



* This drawing is AFP87444.

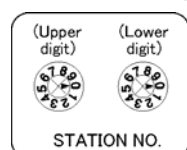
Functions of each part

(1) Operation monitor LEDs .. Indicates communication status and operation mode.



LED	Descriptions
POWER (Power supply)	○ When power is supplied ● When power is not supplied
COMM. (Communication)	○ (ON): Not communicating ○ (Flashing): Communicating (Normal) ○ (Flashing slowly): Communicating (Stop mode) ● (OFF): Abnormal condition
ALARM (Alarm)	○ (ON): Unit error ○ (Flashing): Station No. setting error ● (OFF): Normal unit

(2) Station number selector switches (Rotary switches)



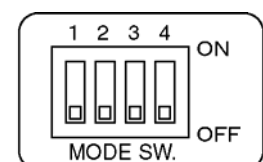
Set the station number of the MEWNET-F. Point the arrow to the number to be used. (Set tens place and ones place separately.)

Setting range: 01 to 32

* When setting numbers exceeding the range, the setup error occurs (ALARM LED flashes), and communication becomes impossible.

* The settings will be accepted when the power turns on.

(3) Mode selector switches Sets the terminal station and the output mode a communication error occurs.



This figure is the example when the switches are all set to the OFF position.

SW	Setting	OFF	ON
1, 2	Terminal station setting	Not terminal station	Terminal station
3	Output condition during a communication error	Output off	Maintains its output condition

* The settings of SW1 and SW2 should be the same.

* The switches are all set to the OFF position at the factory. SW4 is not used.

* The settings will be accepted when the power turns on.

(4) RS485 interface For connecting the communication cables.

(5) Input terminals, Output terminals ... 16-point input terminals and 16-point output terminals (8 points for AFP87432). Including the power supply terminal for an external device.

(6) Power supply terminal..... Supply the power to activate the I/O terminal board.

(7) I/O monitor LEDs Lights up when input or output is ON. Lights off when input or output is OFF.

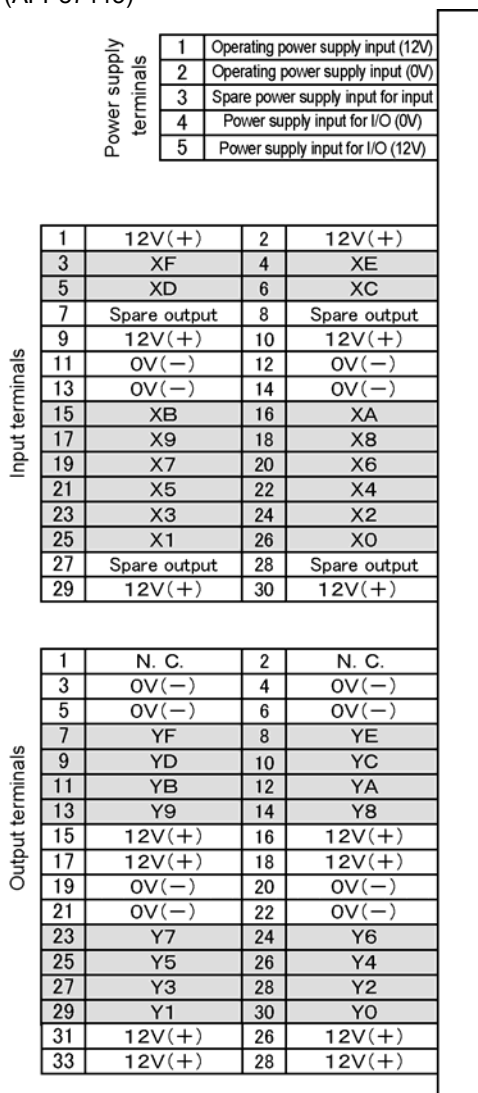
For the information on the specifications and connections of the I/O terminals and power supply terminal, refer to the next page.

2.4.1 I/O Terminal Board Terminals Specifications

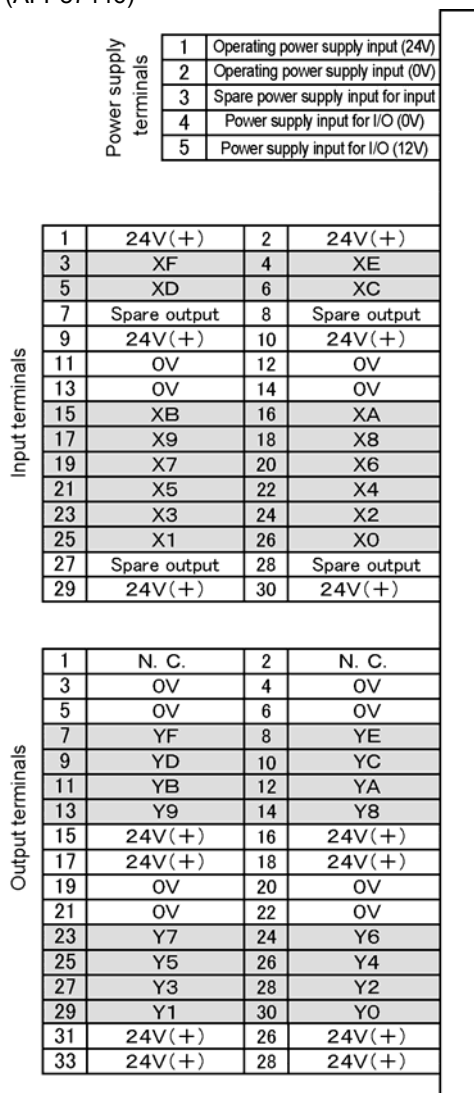
MIL connector type

Terminal layout diagrams

- Operating power supply voltage 12V DC type
(AFP87445)



- Operating power supply voltage 24V DC type
(AFP87446)



Note:

- Use the power supply cable (APL9511) attached to the I/O terminal board [MIL connector type] for the power supply.

* The power supply input terminal for I/O and the 12 V (+) or 24 V (+) terminals are internally connected. The supplied power is used to drive transistors of internal circuit.

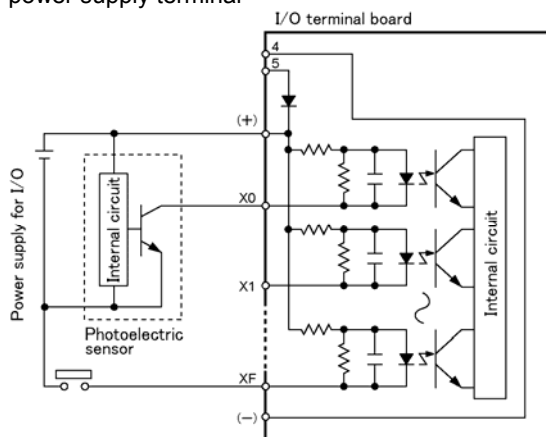
* The spare power input terminal and spare output terminals are internally connected. When supplying DC power (5 V to 24 V) at the power supply terminal, you can use the power to operate an input device connected to an input terminal.

- N. C. means Not Connected. These terminals are not connected internally.

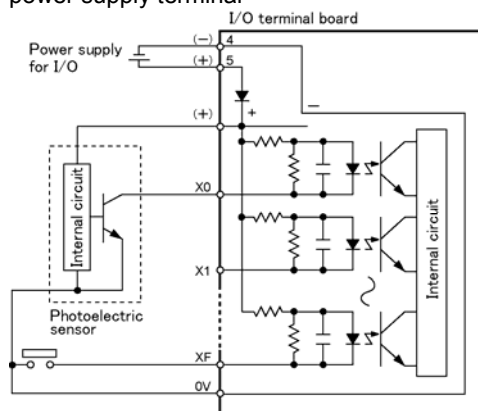
Connection example

Input circuit and external connections

- When power is not supplied through the I/O power supply terminal

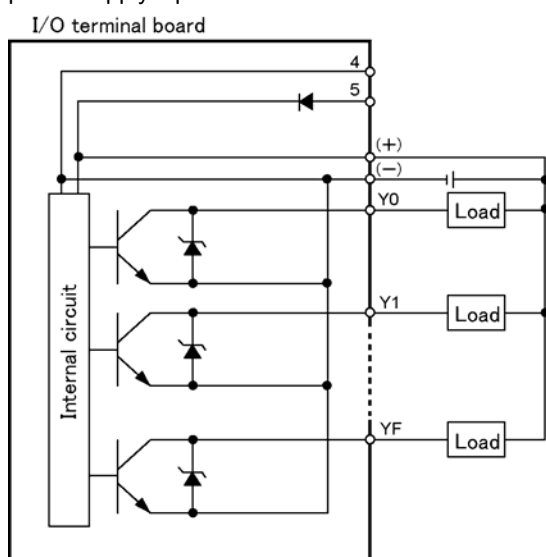


- When power is supplied through the I/O power supply terminal

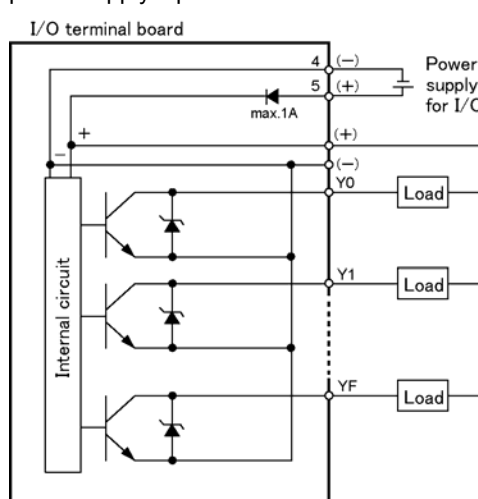


Output circuit and external connections

- When power is not supplied through the I/O power supply input terminal



- When power is supplied through the I/O power supply input terminal



Note:

- When using a limit switch with an LED as the input device, be sure that the internal resistance is 15 k Ω (SL, QL, VL type)
- The (+) side in the diagrams is DC +12 V for AFP87445, and DC +24 V for AFP87446.

Terminal block type

Terminal layout diagrams

- Transistor output type (AFP87444)

2	Y1	1	Y0	Output terminals
4	Y3	3	Y2	
6	Y5	5	Y4	
8	Y7	7	Y6	
10	Y9	9	Y8	
12	YB	11	YA	
14	YD	13	YC	
16	YF	15	YE	
18	24V(−) for Tr	17	24V(+) for Tr	
20	N.C.	19	N.C.	
22	X1	21	X0	Input terminals
24	X3	23	X2	
26	X5	25	X4	
28	X7	27	X6	
30	X9	29	X8	
32	XB	31	XA	
34	XD	33	XC	
36	XF	35	XE	
38	Input COM(+)	37	Input COM(+)	
40	Power supply for operation(0V)	39	Power supply for operation(24V)	
				Power supply terminals

- Relay output type (AFP87432)

2	COM0	1	Y0	Output terminals
4	COM1	3	Y1	
6	COM2	5	Y2	
8	COM3	7	Y3	
10	COM4	9	Y4	
12	COM5	11	Y5	
14	COM6	13	Y6	
16	COM7	15	Y7	
18	24V(−) for Ry	17	24V(+) for Ry	
20	N.C.	19	N.C.	
22	X1	21	X0	Input terminals
24	X3	23	X2	
26	X5	25	X4	
28	X7	27	X6	
30	X9	29	X8	
32	XB	31	XA	
34	XD	33	XC	
36	XF	35	XE	
38	Input COM(+)	37	Input COM(+)	
40	Power supply for operation(0V)	39	Power supply for operation(24V)	
				Power supply terminals



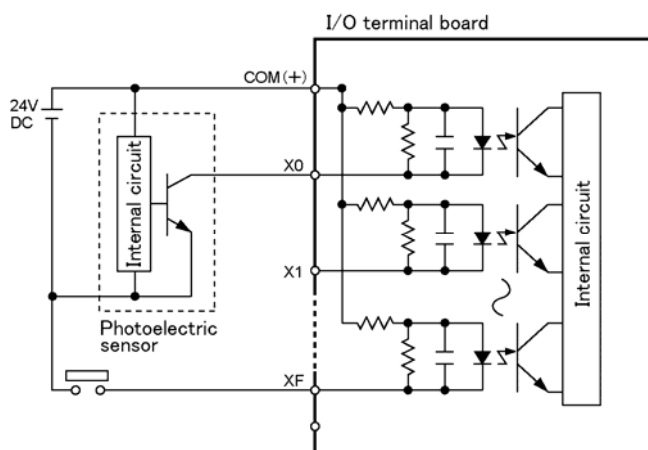
Note:

- The terminal screws for the I/O terminals and power supply terminal are all M3.
- N. C. means Not Connected. These terminals are not connected internally.
- Supply power for internal transistors or relays to pins 17 and 18.

Connection example

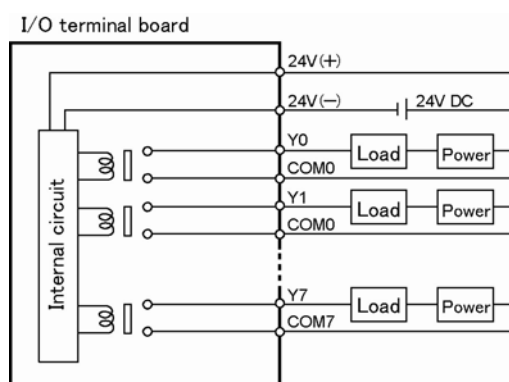
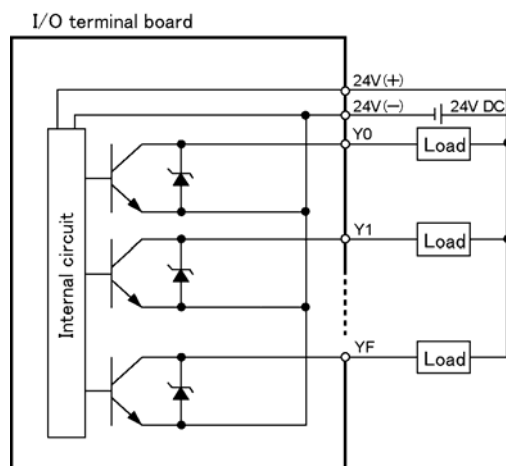
Input circuit and external connections

- Common to Transistor output type (AFP87444) and Relay output type (AFP87432)



Output circuit and external connections

- Transistor output type (AFP87444)
- Relay output type (AFP87432)



Note:

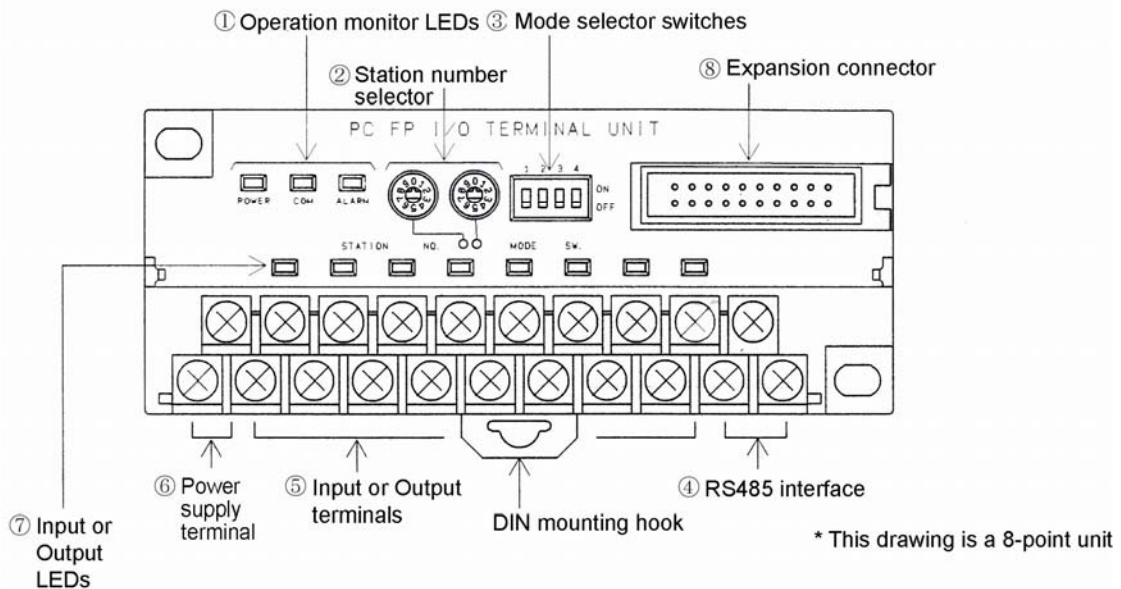
- When using a limit switch with an LED as the input device, be sure that the internal resistance is 15 k Ω (SL, QL, VL type)

2.5 I/O Terminal Unit

I/O terminal unit (Primary unit)

8-point input (AFP87421) 8-point input (AFP87423)

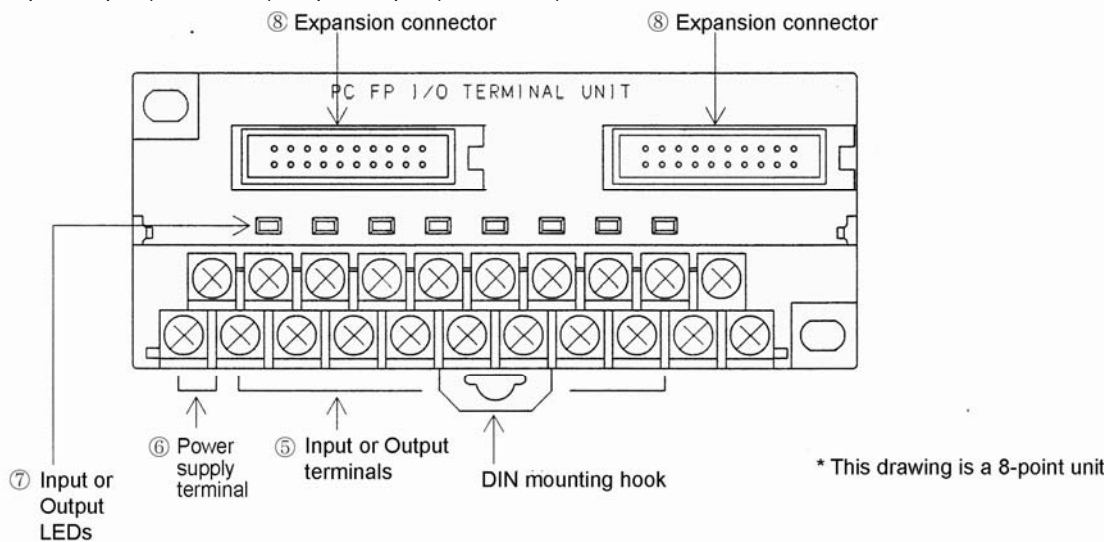
16-point input (AFP87422) 16-point input (AFP87424)



Expansion I/O terminal unit

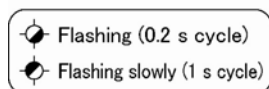
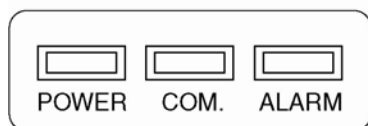
8-point input (AFP87425) 8-point input (AFP87427)

16-point input (AFP87426) 16-point input (AFP87428)



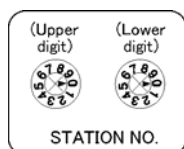
Functions of each part

(1)Operation monitor LEDs .. Indicates communication status and operation mode.



LED	Descriptions
POWER (Power supply)	<ul style="list-style-type: none"> ◐ When power is supplied ● When power is not supplied
COMM. (Communi- cation)	<ul style="list-style-type: none"> ◐ (ON): Not communicating ◐ (Flashing): Communicating (Normal) ◐ (Flashing slowly): Communicating (Stop mode) ● (OFF): Abnormal condition
ALARM (Alarm)	<ul style="list-style-type: none"> ◐ (ON): Unit error ◐ (Flashing): Station No. setting error ● (OFF): Normal unit

(2)Station number selector switches (Rotary switches)



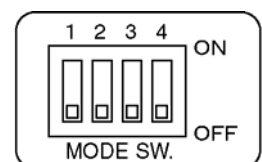
Set the station number of the MEWNET-F. Point the arrow to the number to be used. (Set tens place and ones place separately.)

Setting range: 01 to 32

* When setting numbers exceeding the range, the setup error occurs (ALARM LED flashes), and communication becomes impossible.

* The settings will be accepted when the power turns on.

(3)Mode selector switches Sets the terminal station and the output mode a communication error occurs.



This figure is the example when the switches are all set to the OFF position.

SW	Setting	OFF	ON
1, 2	Terminal station setting	Not terminal station	Terminal station
3	Output condition during a communication error	Output off	Maintains its output condition

* The settings of SW1 and SW2 should be the same.

* The switches are all set to the OFF position at the factory. SW4 is not used.

* The settings will be accepted when the power turns on.

(4)RS485 interface For connecting the communication cables.

(5)Input terminals, Output terminals ... They are configured with 8-point input/output terminals or 16-point input/output terminals.

(6)Power supply terminal..... Supply the power to activate the I/O terminal board.

(7)I/O monitor LEDs Lights up when input or output is ON. Lights off when input or output is OFF.

(8)Expansion connector..... Connects the primary I/O terminal unit and the expansion I/O terminal unit with a cable.
Use a PL Mark expansion cable (APL2510, APL2511 or APL2515).

For the information on the specifications and connections of the I/O terminals and power supply terminal, refer to the next page.

2.5.1 I/O Terminal Unit Terminals Specifications

Input unit

Terminal layout diagrams

- 16-point type Primary unit (AFP87422)

Expansion unit (AFP87426)

1	24V (-)	2	24V (+)		
3	(+)	4	X0		
5	(-)	6	X1		
7	(+)	8	X2		
9	(-)	10	X3		
11	(+)	12	X4		
13	(-)	14	X5		
15	(+)	16	X6		
17	(-)	18	X7		
19	(+)	20	X8		
21	(-)	22	X9		
23	(+)	24	XA		
25	(-)	26	XB		
27	(+)	28	XC		
29	(-)	30	XD		
31	(+)	32	XE		
33	(-)	34	XF		
35	(F.G.)	36	RS485 (+)		
37	RS485 (-)				

Power supply terminals

Input terminals

RS485 interface

- 8-point type Primary unit (AFP87421)

Expansion unit (AFP87425)

1	24V (-)	2	24V (+)		
3	(+)	4	X0		
5	(-)	6	X1		
7	(+)	8	X2		
9	(-)	10	X3		
11	(+)	12	X4		
13	(-)	14	X5		
15	(+)	16	X6		
17	(-)	18	X7		
19	(F.G.)	20	RS485 (+)		
21	RS485 (-)				

Power supply terminals

Input terminals

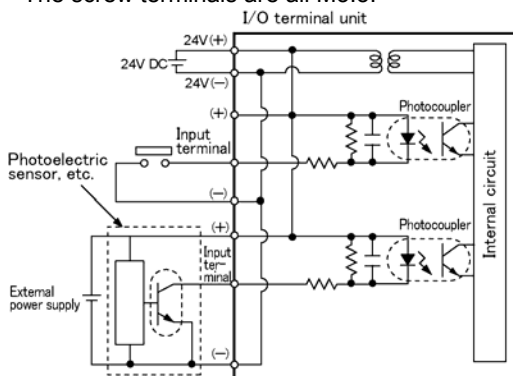
RS485 interface

- In case of expansion unit, the terminals of the RS485 interface (pins 20 and 21 for the 8-point unit, pins 36 and 37 for the 16-point unit) is N.C. (Not connected) terminals. These terminals are not connected internally.



Note:

- Power supply input (24 V) terminal and all (+) terminals are internally connected. Power supply input (0 V) terminal and all (-) terminals are internally connected. When using (+) or (-) terminal as a common terminal, use the one closest to the output terminal.
- The screw terminals are all M3.5.



Note:

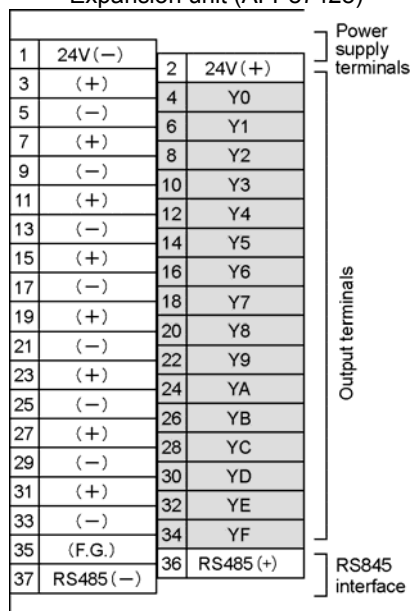
- When using a limit switch with an LED as the input device, be sure that the internal resistance is 15 kΩ (SL, QL, VL type)
- Precautions when using an external power supply
- Use an external power supply at 26.4 V DC or less. (It does not work with the power supply for operating.)
- When using an external power supply at a low voltage, the current may flow to the external power supply from the 24 V DC for operating even if it is off. Therefore, the leak current should be 1 mA or less when it is off.

Output unit

Terminal layout diagrams

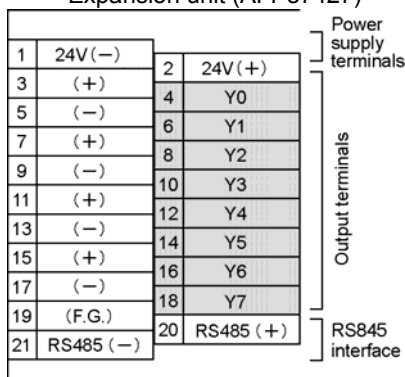
- 16-point type Primary unit (AFP87424)

Expansion unit (AFP87428)



- 8-point type Primary unit (AFP87423)

Expansion unit (AFP87427)



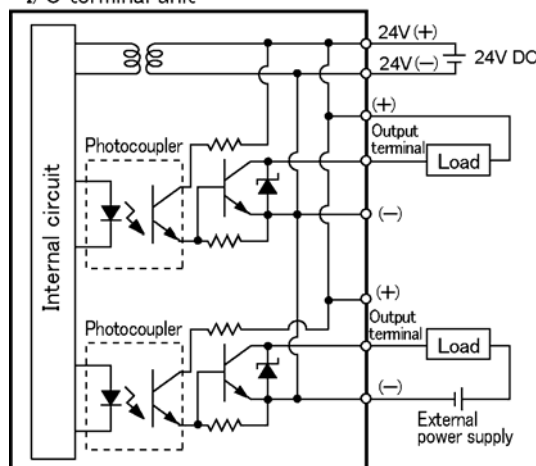
- In case of expansion unit, the terminals of the RS485 interface (pins 20 and 21 for the 8-point unit, pins 36 and 37 for the 16-point unit) is N.C. (Not connected) terminals. These terminals are not connected internally.



Note:

- Power supply input (24 V) terminal and all (+) terminals are internally connected. Power supply input (0 V) terminal and all (-) terminals are internally connected. When using (+) or (-) terminal as a common terminal, use the one closest to the output terminal.
- The screw terminals are all M3.5.

I/O terminal unit



Note: Precautions when using an external power supply

- Use an external power supply in the range of 20.4 V DC to 26.4 V DC. (It does not work with the power supply for operating.)
- Up to 16 points can be used with the power supply of 0.5 A. (All the points can be simultaneously turned on.) However, in this case, use the (-) terminal that is close to the output terminal to be used.

Chapter 3

Unit Specifications

3.1 General Specifications (Common to the System)

Item	Specifications
Ambient temperature	0~55°C
Storage temperature	-20~70°C
Ambient humidity	30 to 85 % RH (at 25°C, non-condensing)
Storage humidity	30 to 85 % RH (at 25°C, non-condensing)
Vibration resistance	10 to 55 Hz, 1 cycle/min. double amplitude of 0.75 mm, 10 min. on 3 axes
Shock resistance	Shock of 98 m/s ² , 4 times on 3 axes
Noise immunity	1000 V[p-p] with pulse widths of 50 ns or 1μs (based on in-house measurements)
Operating condition	Free from corrosive gases and excessive dust

3.2 Performance Specifications (Common to the System)

Item			Specifications		
Communication method			Two-wire, half duplex transmission		
Synchronous method			Start stop synchronous system		
Transmission distance Note1)			700 m (total length) per 1 port (2 paths)		
Baud rate			0.5 M bps		
Transmission line			2-wire cable (VCTF0.75 mm ² x 2C (JIS) or equivalent) is used		
Interface			Multi-drop (RS485)		
Transmission error check			CRC (Cyclic Redundancy Check) method		
I/O control	No. of master units per 1 CPU		Max. 4 units		
	No. of slave stations per 1 master unit		Max. 32 stations		
	No. of controllable I/O points	Per 1 master unit		Max. 2048 points (FP2/FP3) Max. 4096 points (FP2SH/FP10SH) For FP3 Master unit Ver. 1.4 or older, max. 1024 points	
		No. of I/O points for each station	I/O Terminal Board	32 points per unit (16-point input + 16-point output) or 24 points (Input: 16 points + Output: 8 point) * I/O numbers are allocated from the input side.	
			I/O Terminal Unit	Per unit, when using a single unit: 16 points, when using expansion units: 32 points * Number of occupied points is the same for the 8-point unit and 16-point unit. When combining the input and output, I/O numbers are allocated from the input side, which are 16-point input and 16-point output.	
	No. of controllable slots	Per 1 CPU		Max. 128 slots	
		Per 1 master unit		Max. 64 slots	
		No. of slots for each station	FP2/FP3 Slave station system	Max. 24 slots	
			I/O Terminal Board	1 slot	
	I/O Terminal Unit		1 slot * Number of slot is 1 even if a unit is added.		
Units that cannot be installed on the backplane of slave station system			FP3	Master Unit, MEWNET-P/W/H Link Unit ET-LAN Unit, Computer Communication Unit (CCU), C-NET Link Unit, S-LINK Unit Advanced units that occur interrupt	
			FP2	Multi-wire Link Unit, MEWNET-VE Link Unit ET-LAN Unit, Computer Communication Unit (CCU), Multi Communication Unit A/D Unit, D/A Unit, RTD Unit Positioning Unit RTEX Positioning Unit Interpolation type Positioning Unit Multifunction type Advanced units that occur interrupt	

Note1) The transmission distance varies according to the used cable and type of unit.

Note2) The advanced units that occur interrupt are as follows. - Interrupt unit

- High-speed counter unit and Pulse output unit can be used when setting to the mode that does not occur interrupt.

- As there is no indication for the error that a prohibited unit is installed on FP2 A/D unit, D/A unit and RTD unit, no error indication will be displayed, even if they are installed incorrectly.

Note3) When using a positioning unit for FP2 slave station system, and if the time taken from the start-up to the completion of positioning operation is shorter than the scan time, flags such as the output end flag and pulse output flag may not be read and an error may occur. The time from the start-up to the completion of positioning operation must be longer than the scan time.

Note4) When using a S-LINK unit for FP2 slave station system, the settings of I/O points including 96 input points and 96 output points cannot be used.

3.3 Rating and Specifications of Components

3.3.1 Master Unit

Type	Consumption current (5 V DC)	Weight	Power supply voltage	Model No.
FP2 Multi-wire Link Unit	220 mA or less	Approx. 110 g	-	AFP2720
FP3 Remote I/O Master Unit	450 mA or less	Approx. 260g	-	AFP3742

Note) The consumption current is the value when the station number LEDs are all lights up.

3.3.2 Slave Unit

Type	Consumption current (5 V DC)	Weight	Power supply voltage	Model No.
FP2 Remote I/O Slave Unit	150 mA or less	Approx. 110 g	-	AFP2745
FP3 Remote I/O Slave Unit	400 mA or less	Approx. 310g	-	AFP3745

3.3.3 I/O Terminal Board

General specifications

Type	Consumption current	Weight	Power supply voltage	Model No.
FP I/O Terminal Unit [MIL connector type (12 V DC)]	200 mA or less	Approx. 470g	10.2 V DC to 13.2 V DC	AFP87445
FP I/O Terminal Board [MIL connector type (24 V DC)]	100 mA or less	Approx. 470g	20.4 V DC to 26.4 V DC	AFP87446
FP I/O Terminal Board [Terminal block type (Tr. output)]	100 mA or less	Approx. 520g	20.4 V DC to 26.4 V DC	AFP87444
FP I/O Terminal Board [Terminal block type (Ry. output)]	100 mA or less	Approx. 540g	20.4 V DC to 26.4 V DC	AFP87432

I/O Terminal Board I/O part specifications

-Input part (Common)

Item	Specifications	
Type	AFP87445	AFP87446, AFP87444, AFP87432
Rated input voltage	12 V DC	24 V DC
Input impedance	Approx. 2 kΩ	Approx. 4.4 kΩ
Insulation method	Photocoupler	
ON delay time	2 ms or less	
OFF delay time	2 ms or less	
Power supply voltage range	10.2 V DC to 13.2 V DC	20.4 V DC to 26.4 V DC
No. of circuits	16 points/common	
ON voltage	8.6 V or less	19.2 V or less
OFF voltage	2.4 V or more	
Common polarity	Positive (+) polarity	

-Output

Transistor output type (AFP87445, AFP87446, AFP87444)

Item	Specifications	
Type	AFP87445	AFP87446, AFP87444
Rated output voltage	12 V DC	24 V DC
Insulation method	Photocoupler	
ON delay time	1 ms or less	
OFF delay time	1 ms or less	
Power supply voltage range	10.2 V DC to 13.2 V DC	20.4 V DC to 26.4 V DC
Max. control capacity	0.2 A/point	
Leakage current	100μA or less	
Residual voltage	1.5 V or less	
No. of circuits	16 points/common	
Output type	Transistor output (NPN open collector)	
Common polarity	Positive (+) polarity	

Relay output type (AFP87432)

Item	Specifications	
Type	AFP87432	
Rated control capacity:	2A 250V AC , 2A 30 DC	
Insulation method	Photocoupler	
ON delay time	10 ms or less	
OFF delay time	10 ms or less	
Lifetime	Mechanical lifetime	Min. 20,000,000 operations
	Electrical lifetime	Min. 100,000 operations
External power supply	Voltage	22.2 V DC to 26.4 V DC
	Current	100 mA or less
No. of circuits	1 point/common x 8 points (independent common)	
Output type	Relay output	

3.3.4 I/O Terminal Unit

General specifications

Type	Consumption current (24 V DC)		Weight	Model No.
	When all points are OFF	When all points are ON		
FP I/O Terminal Unit (Input 8 points)	0.04 A or less	0.1 A or less Note1)	Approx. 200g	AFP87421
FP I/O Terminal Unit (Input 16 points)	0.04 A or less	0.15 A or less Note1)	Approx. 280g	AFP87422
FP I/O Terminal Unit (Output 8 points)	0.04 A or less	0.1 A or less Note2)	Approx. 200g	AFP87423
FP I/O Terminal Unit (Output 16 points)	0.04 A or less	0.15 A or less Note2)	Approx. 280g	AFP87424
Expansion I/O terminal unit (Input 8 points)	-	0.06 A or less Note1)	Approx. 170g	AFP87425
Expansion I/O terminal unit (Input 16 points)	-	0.11 A or less Note1)	Approx. 270g	AFP87426
Expansion I/O terminal unit (Output 8 points)	-	0.06 A or less Note2)	Approx. 170g	AFP87427
Expansion I/O terminal unit (Output 16 points)	-	0.11 A or less Note2)	Approx. 270g	AFP87428

Note1) This is the value including the input current when all points are ON.

Note2) This is the value with no load when all points are ON.

I/O part specifications

Input unit

Item	Specifications	
Type	8-point input unit	16-point input unit
Rated input voltage	24 V DC	
Allowable input voltage	20.4 V DC to 26.4 V DC	
Input impedance	Approx. 4.4 kΩ	
Insulation method	Photocoupler	
ON delay time	2 ms or less	
OFF delay time	2 ms or less	
No. of circuits	8 points/common	16 points/common
ON voltage	19.2 V or less	
OFF voltage	2.4 V or more	
Common polarity	Negative (-) polarity	

Output unit


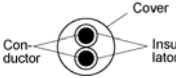
Item	Specifications	
Type	8-point output unit	16-point output unit
Rated output voltage	24 V DC	
Allowable output voltage	20.4 V DC to 26.4 V DC	
Insulation method	Photocoupler	
ON delay time	1 ms or less	
OFF delay time	1 ms or less	
Max. control capacity	0.5 A/point, 1 A/common	
Leakage current	100 μ A or less	
Residual voltage	1.5 V or less	
No. of circuits	8 points/common	16 points/common
Output type	Transistor output (NPN open collector)	
Common polarity	Positive (+) polarity	

Note) The input voltage and the output voltage is the same as the power supply voltage.

3.4 Transmission Cable Specifications

3.4.1 Recommended Cables

The cables in the table below are recommended for FP remote I/O system [MEWNET-F]. The guaranteed transmission distance vary according to the used cables.

Cable	Cross-sectional view	Conductor		Insulator		Cable diam.	Transmission distance <small>Note1)</small>	Sample appropriate cable
		Size	Resistance (at 20°C)	Material <small>Note2)</small>	Thickness			
Shielded twisted pair		1.25 mm ² (AWG16) or more	Max. 16.8 Ω/km	Polyethylene	Max. 0.5 mm	Approx. 8.5 mm	700 m (300 m)	Hitachi Cable, Ltd. KPEV-S1P x 1.25SQ Belden 9860
		0.5 mm ² (AWG20) or more	Max. 33.4 Ω/km	Polyethylene	Max. 0.5 mm	Approx. 7.8 mm	600 m (300 m)	Hitachi Cable, Ltd. KPEV-S1P x 0.5SQ Belden 9207
VCTF		0.75 mm ² (AWG18) or more	Max. 25.1 Ω/km	Polyvinyl chloride	Max. 0.6 mm	Approx. 6.6 mm	400 m (200 m)	VCTF0.75 mm ² x 2C (JIS)

Note1) When any of the product numbers AFP87441, AFP87442, AFP3741, AFP5741 and various companies' valve controllers is contained in the network, the maximum transmission distance is the values in parentheses. For the information on various companies' valve controllers, please contact each company.

Note2) Polyvinyl chloride has worse electrical characteristics than polyethylene, its transmission distance is shorter.

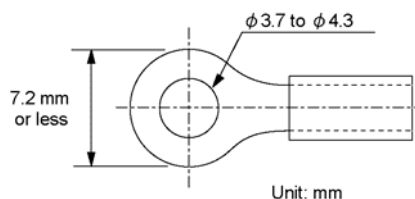
Note3) Use only one type of transmission cable. Do not mix more than 1 type.

Note4) Twisted pair cables are recommended in noisy environments.

3.4.2 Terminals

Be sure to use crimp terminals for processing the end of transmission cables.

If connecting the cables directly to the terminal blocks without using crimp terminals, contact failures may easily occur and normal communication may not be performed.



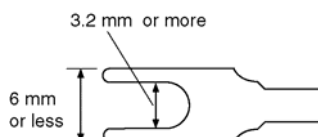
Suitable crimp terminal

1. Ring terminal
2. Insulated ring terminal
3. Fork terminal

Manufacturer	Shape	Model name
JST Mfg. Co., Ltd.	Ring type	1.25-YS3A

Terminals for FP2 Multi-wire Link unit/FP2 Remote I/O Slave Unit

- Use M3 terminal screws for the terminal of FP2 Multi-wire Link Unit/FP2 Remote I/O Slave Unit.
Use the crimp terminals having the following shapes.- Fasten the terminals securely applying a tightening torque of 0.5 to 0.6 N m.



Example of suitable crimp terminal

Manufacturer	Shape	Model name
JST Mfg. Co., Ltd.	Fork type	2-MS3

Suitable wires (Copper strand wire)

- Size: AWG20-12, Rated temperature: 60/75 °C
Tightening torque: 0.5-0.6 N m (5.3 lb-in)

3.5 Communication Time

The communication time regarding the remote I/O system [MEWNET-F] control is described.

3.5.1 Remote I/O Scan Time [T_R]

The remote I/O scan time represents the time it takes the master unit, with respect to the connected slave stations, to send all the output data which has been written to the buffer memory in the master unit and write all the input data received from the slave stations to the buffer memory in the master unit.

$$T_R = 0.8 + 0.85 \times n + 0.55 \times N + 0.13 \times W \text{ (ms)}$$

n : No. of I/O terminal boards

N : No. of slave units

W : No. of I/O words used by the remote I/O system

[Example]

When 10 FP I/O terminal boards (16 input points and 16 output points) and a slave station (connected to one slave unit, 4 input units (32 input points), 4 output unit (32 output points)) are connected.

$$\begin{aligned} T_R &= 0.8 + 0.85 \times 10 + 0.55 \times 1 + 0.13 \times \frac{32 \times 10 + 32 \times 4 + 32 \times 4}{16} \\ &= 14.53 \text{ (ms)} \end{aligned}$$

3.5.2 Remote I/O Memory Access Time [T_{RM}]

The remote I/O memory access time represents the time it takes the master unit to receive the memory access end message from the slave unit after it receives a memory access request from the CPU.

As this value is a guide, confirm on the actual units.

$$T_{RM} = T_R \times 2 + (0.7 + 0.17 \times W_{RM}) \text{ (ms)}$$

T_R : Remote I/O scan time

W_{RM} : Number of memory access words

[Example]

When 5 I/O terminal boards (16 input points and 16 output points each) and a slave station [connected to 1 slave unit, 2 input units (32 input points), 2 output unit (32 output points) and 1 advanced unit (occupies 32 points)] are connected and a 32-word memory access is performed with an advanced unit.

$$\begin{aligned} T_{RM} &= (0.8 + 0.85 \times 5 + 0.55 \times 1 + 0.13 \times \frac{32 \times 5 + 32 \times 2 + 32 \times 2 + 32}{16}) \times 2 + (0.7 + 0.17 \times 32) \\ &= 8.2 \times 2 + 6.14 \\ &= 22.54 \text{ (ms)} \end{aligned}$$

3.5.3 Input/Output Response Time for Remote I/O System [T_{RES}]

The input/output response time for a remote I/O system represents the time it takes to send the input signal from the slave station to the CPU via the master unit and perform the processing, and the time until the output signal is actually sent to the slave station based on the processing result.

$$T_{RES} = T_{IRES} + T_C + T_{ORES}$$

$$\left\{ \begin{array}{l} T_{RES} : \text{Input/Output response time for Remote I/O system} \\ T_{IRES} : \text{Input response time for Remote I/O system} \\ T_C : \text{Output response time for Remote I/O system} \\ T_{ORES} : \text{CPU scan time} \end{array} \right.$$

The maximum values of input/output response time for the remote I/O system are obtained in the following manner.

$$T_{RES-MAX} = T_{IRES-MAX} + T_C + T_{ORES-MAX}$$

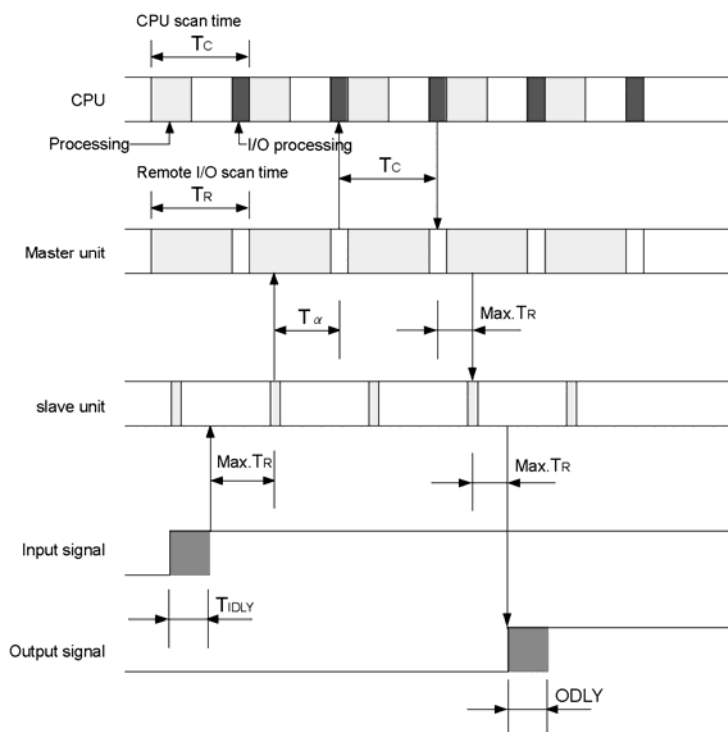
$$T_{IRES-MAX} = T_{IDLY} + T_R + T_\alpha$$

- T_{IDLY} : Input delay time
- T_R : Scan time for remote I/O system
- T_α : - When synchronous mode
 - When $T_C < T_R$, $T_\alpha = T_R$
 - When $T_C > T_R$, $T_\alpha = T_C$
- When asynchronous mode
 - When $T_C < T_R$, $T_\alpha = T_C + T_R$
 - When $T_C > T_R$, $T_\alpha = T_C$

$$T_{ORES-MAX} = T_R \times 2 + T_{ODLY}$$



Reference: For information on the synchronous mode and asynchronous mode, <7.4 Remote I/O Update Timing Method>



Chapter 4

Installation and Wiring

4.1 Preparation of MEWNET-F Components

Prepare each stations that configures the remote I/O system [MEWNET-F].The system configuration and the condition and method of installation is described.

4.1.1 Master Station (Master Unit)

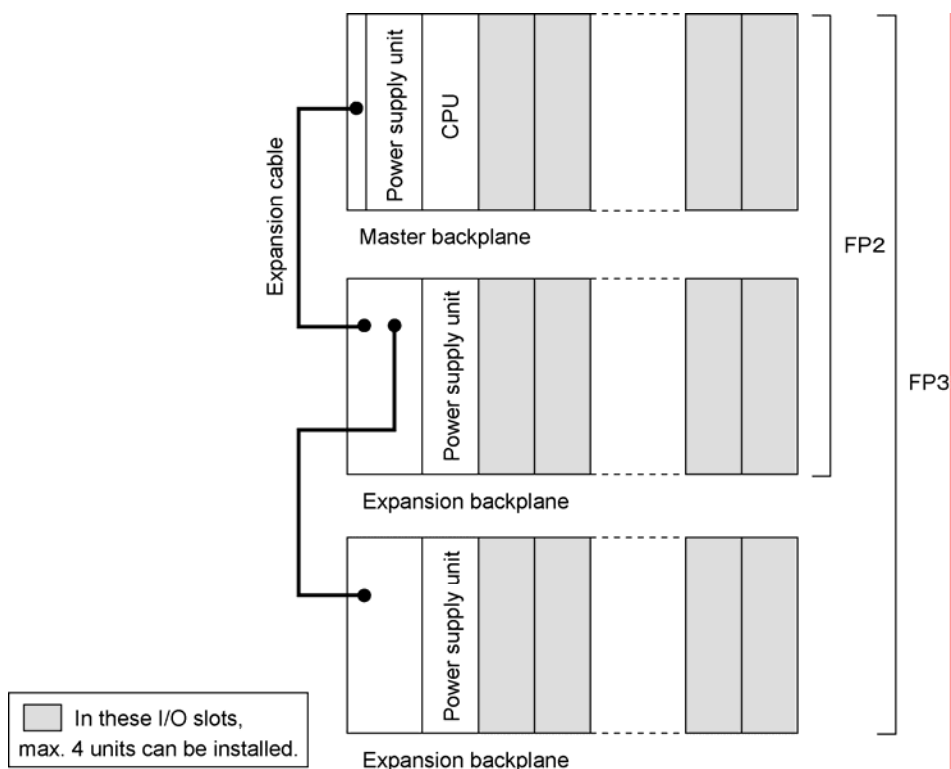
A master station can be configured with a "remote I/O master unit" installed on the FP2/FP2SH or FP3/FP10SH system.Up to 4 units can be installed to one CPU unit.

Installation condition

A master unit can be installed in any I/O slot on a mater backplane or expansion backplane.

Up to 4 units can be installed.

The conditions of system configuration (such as number of expansion, restrictions on power supply and total length) are the same as the normal case.



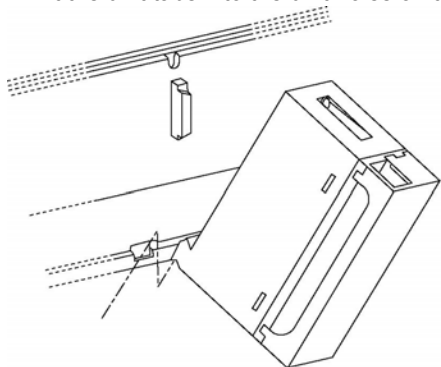
Installation method

Be sure to remove or install units only when all power is off.

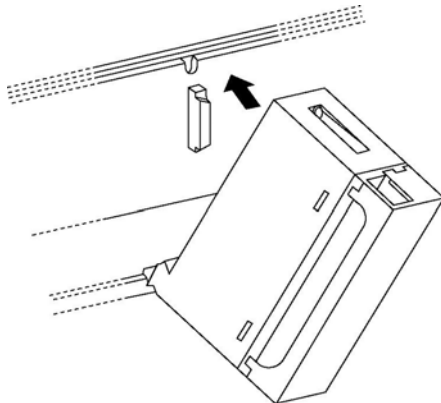
Do not touch the terminals of connectors directly. It may cause contact failures or the damage to elements due to static electricity/

FP3/FP10SH

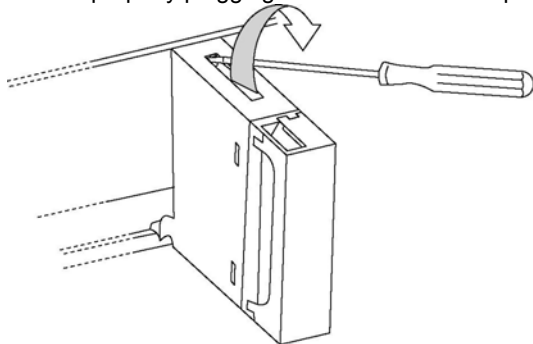
1. Fit the unit tabs into the unit holes on the backplane.



2. Push the unit in the direction of the arrow to plug it into the backplane.



3. After properly plugging the unit into the backplane, tighten the installing screw at the top.



Reference: For FP2/FP2SH, <FP2/FP2SH Hardware Manual ARCT1F320E>

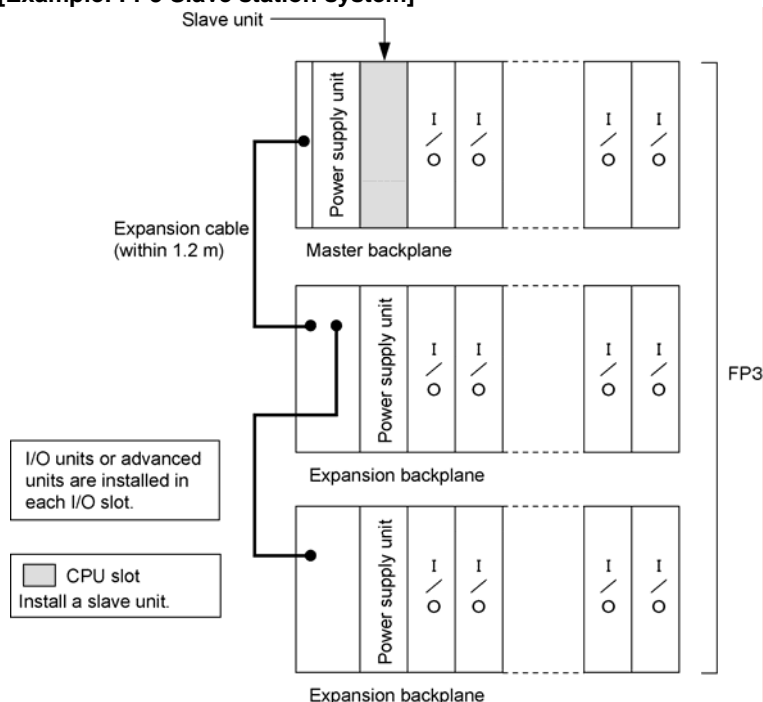
4.1.2 Slave Station System (Slave Unit)

When installing a "FP2 Remote I/O Slave Unit" or "FP3 Remote I/O Slave Unit" instead of a CPU, the slave station with the slave unit is controlled by the CPU on the master station.

Installation condition

- Install a slave unit in the CPU slot position of the master backplane.
- With FP2 backplane H type
When using a 1-module type power supply unit, a space of 1 module will be created between a slave station and the power supply unit. In this case, do not install a wiring line in this space.
- In the I/O slots, you can install input units, output units or advanced units which are controlled by the CPU from the master station. (For information on the installing method, refer to the case of a master unit in the previous page.) Note that some advanced units cannot be installed.
- Up to 3 backplanes including a master backplane can be added. Use expansion cables following the restriction described in the table below. Other conditions of system configuration such as restrictions on power are the same as the normal case.

[Example: FP3 Slave station system]



Restrictions on the expansion with slave stations

	Backplane type	No. of connected boards	Expansion cable
FP2	Standard type	Max. 1 board	AFP2510(0.6m) AFP2512(2m)
	H type	Max. 2 boards	2.6 m or less in total
FP3		Max. 2 boards	AFP3510 (50cm) AFP3511 (1m)



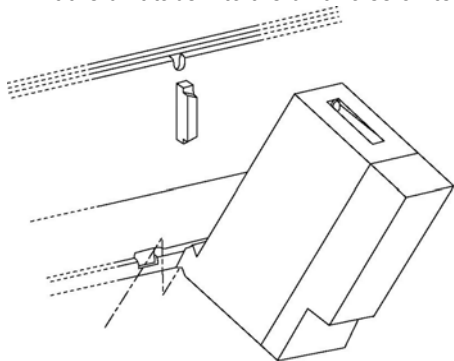
Reference: For information on the advanced units that cannot be installed,
<3.2 Performance Specifications>

Installation method

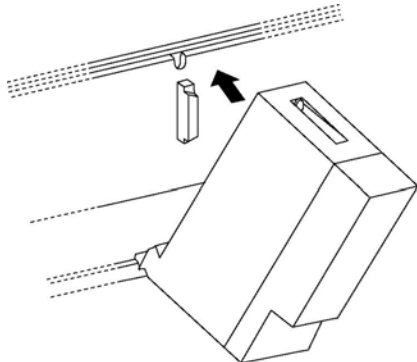
- Be sure to remove or install units only when all power is off.
- Do not touch the terminals of connectors directly. It may cause contact failures or the damage to elements due to static electricity/

FP3

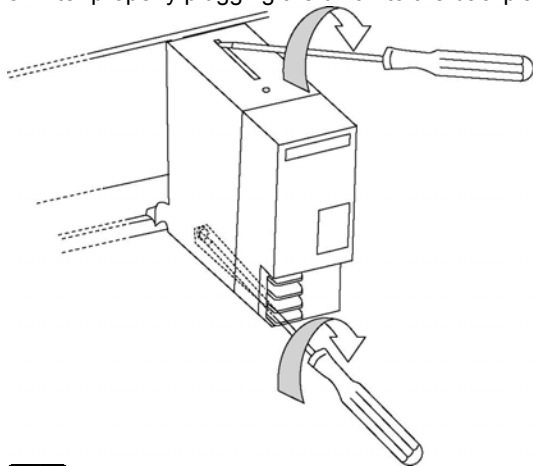
1. Fit the unit tabs into the unit holes on the backplane.



2. Push the unit in the direction of the arrow to plug it into the backplane.



3. After properly plugging the unit into the backplane, tighten the installing screw at the top and bottom.



Reference: For FP2/FP2SH, <FP2/FP2SH Hardware Manual ARCT1F320E>

4.1.3 I/O Terminal Board (Slave Station)

"FP I/O Terminal Board" is an exclusive I/O terminal for the remote I/O system [MEWNET-F] that can be controlled as "Slave station" with the CPU on the master station. One unit configure one station, and no restriction on the usable number of units if it is within the number of total slave stations. The MIL connector type and the terminal block type are available.

Installation method

- To install a unit on DIN rails, use the DIN rail mounting hook which is attached to the mounting plate.

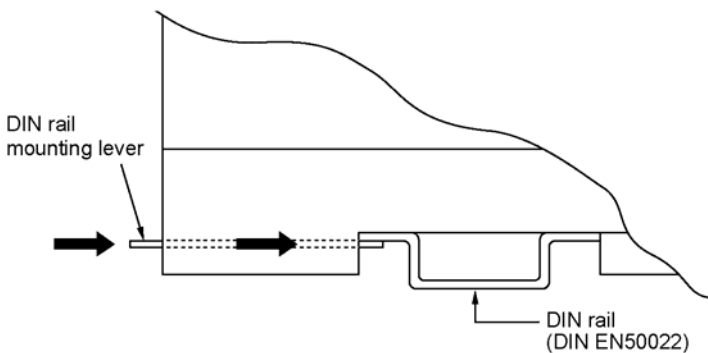


Note:

Avoid using rail mounting in locations with sever vibrations and shock. Mount directly to the panel with screws.

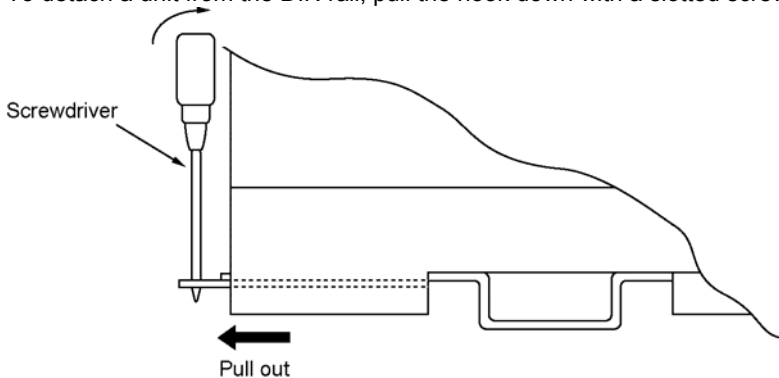
Installation

Align it with the mounting rail groove and push it down to install it.



Removal

To detach a unit from the DIN rail, pull the hook down with a slotted screwdriver.



Reference: For information on the mounting hole dimensions, <Chapter 10 Dimensions>

4.1.4 I/O Terminal Unit (Slave Station)

"FP I/O Terminal Unit" is an exclusive I/O terminal for the remote I/O system [MEWNET-F] that can be controlled as "Slave station" with the CPU on the master station. One unit configure one station, and no restriction on the usable number of units if it is within the number of total slave stations.

Also, I/O can be configured if necessary by connecting expansion units.

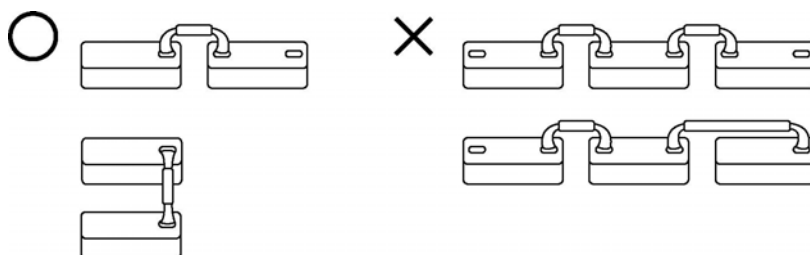
Expansion of I/O terminal unit

Only one expansion unit can be connected to one master unit. (Up to two connections are possible. More than three connections are not possible.)

The input or output, and 8 points or 16 points can be freely selected and combined.

An expansion unit has two expansion connectors. Use only any one to connect the unit to the master unit.

Use a PLC Mark II expansion cable to connect an expansion unit to a master unit. (A 8-cm cable is attached to an expansion unit as a standard accessory.)



Installation method

To install a unit on DIN rails, use the DIN rail mounting lever which is attached to the mounting plate of I/O terminal board.



Note:

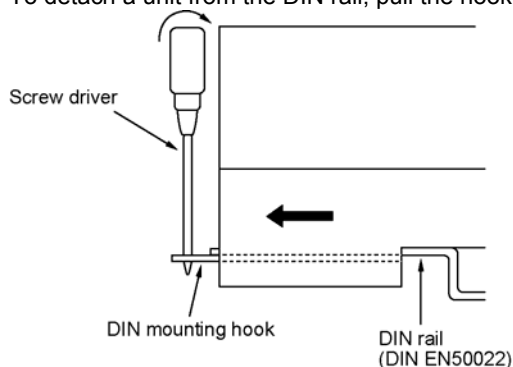
Avoid using rail mounting in locations with severe vibrations and shock. Mount directly to the panel with screws.

Installation

Align it with the mounting rail groove and push it down to install it.

Removal

To detach a unit from the DIN rail, pull the hook down with a slotted screwdriver.

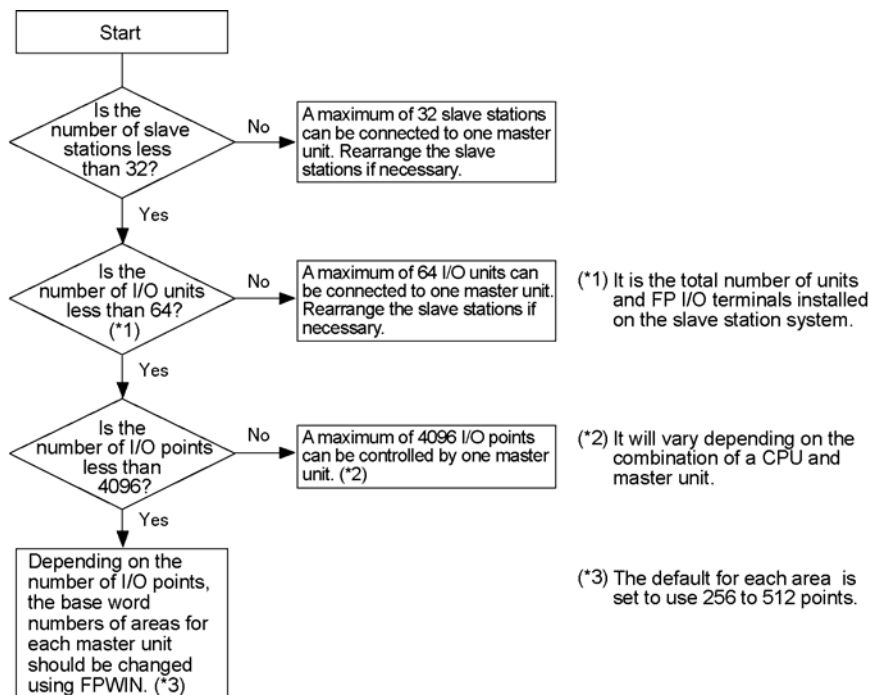


Reference: For information on the mounting hole dimensions, <Chapter 10 Dimensions>

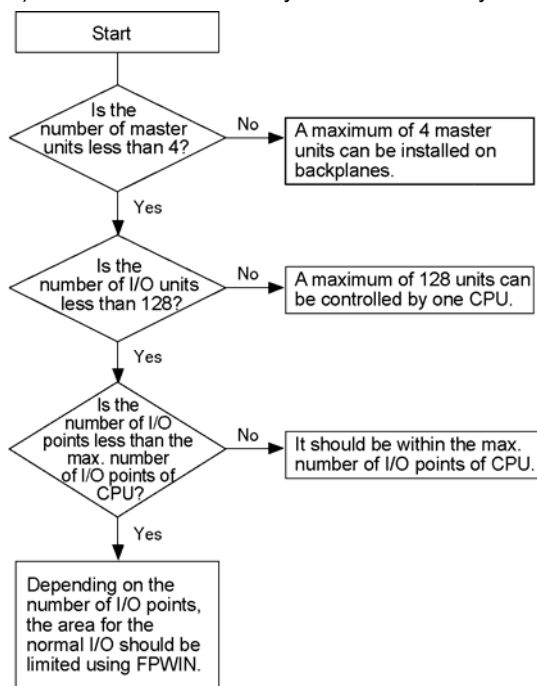
4.1.5 Reference (Check Flow Chart>

The flowchart for checking whether or not each station that is configured meets the system specifications.

1) First, check the slave stations connected to the same master unit. Check the slave stations for each master unit.



2) Check the remote I/O system controlled by one CPU.



4.2 Power Up Sequence

The procedure for starting the remote I/O system [MEWNET-F] is as follows.

1. Power up all the remote I/O controlled slave stations.
↓
2. Power up the master station system (i.e. the system that the master unit is connected). (The remote I/O control will be performed for the running slave stations at this point.)
↓
3. Set the CPU of the master station system to "RUN mode".

The basic procedure is as above, however, the procedure after the start-up may be different according to the settings.

4.2.1 Remote I/O Mapping, Slave Station Connection Confirmation Mode

If a slave station registered in the remote I/O map has not been turned on, the operation will not start until the slave station is turned on although the master station system has been turned on and set in "RUN mode" (The PROG. LED of the CPU is blinking during confirmation). The remote I/O control will be performed when setting to "RUN mode", if the master station system is turned on after all the registered slave stations have been turned on.



Reference: <7.3 Slave Station Connection Confirmation Mode>

4.2.2 Remote I/O Mapping, Slave Station Connection Not Confirmed Mode

Remote I/O control is performed only for the slave stations which have been already turned on when the master station system turns on (3).

Even if there is a slave station which is not activated when the master unit is turned on, if it has been registered in the remote I/O map, it will be controlled by the master unit after it powers up.



Reference: <6.2 Automatic I/O Number Allocation and Arbitrary I/O Number Allocation>

4.2.3 Remote I/O Map Not Registered Mode

Remote I/O control is performed only for the slave stations which have been already turned on when the master station system turns on (2). (Automatic allocation)

If you turn on the slave stations after turning on the master unit, the CPU on the master station will not be able to control the slave stations. You may not allocate I/O numbers in sequence.

Be sure to turn on the slave stations to be controlled first, then turn on the master station.

Turn on the master station system after turning on all the slave stations.



Reference: <6.2 Automatic I/O Number Allocation and Arbitrary I/O Number Allocation>

When actually controlling devices, it is recommended to register an remote I/O map.

Chapter 5

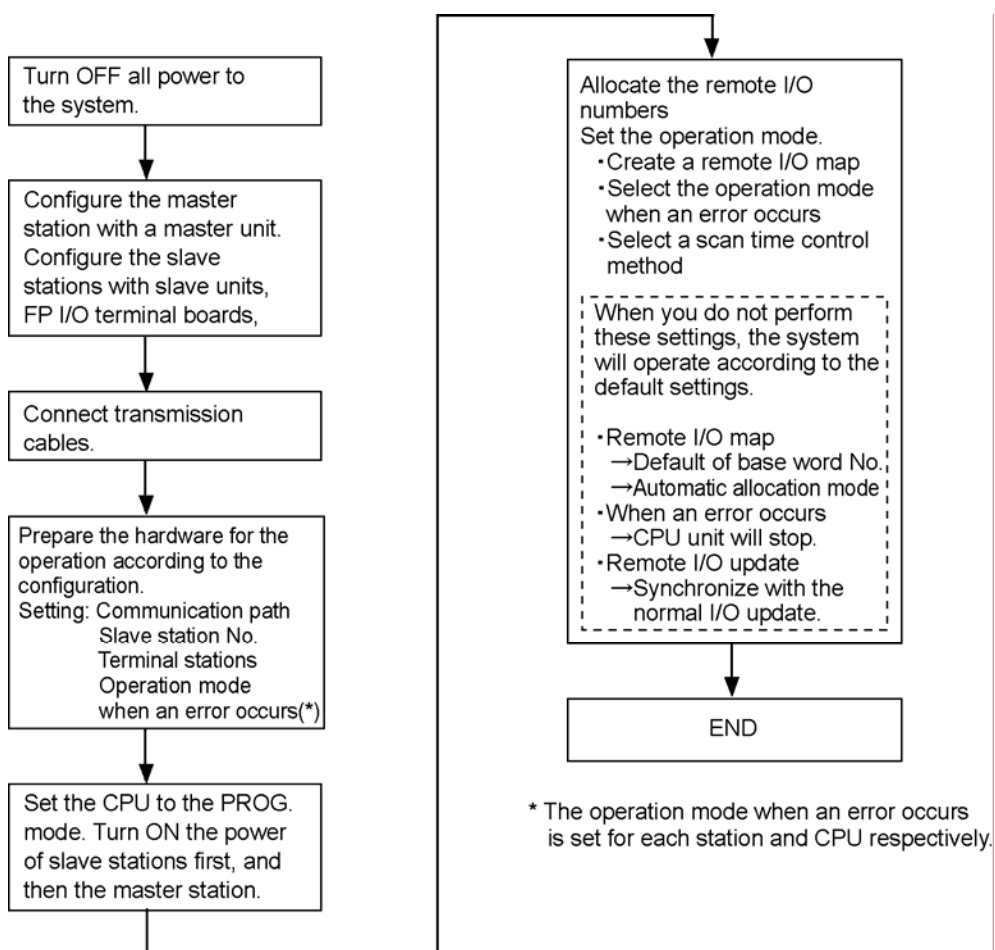
Connection for the Remote I/O System

5.1 Connection for the Remote I/O System

This chapter explains the connection and setting procedure for the remote I/O system [MEWNET-F]. The connection and setting is performed according to the connection pattern or operation. Note the followings when connecting the remote I/O system.

- Connection patter, station number of slave stations
- Remote I/O map
- Process when an error occurs
- Timing of remote I/O update
- Programming tool to be used for remote programming

5.1.1 Description of Connection and Setting Procedure



5.2 Connection Pattern for MEWNET-F

There are following 6 types (A to F) of patterns for connecting the master station (master unit) and slave stations (such as slave units and FP I/O terminal). For the FP2 Multi-wire Link Unit, only the connection patterns A and B are available.



Note:

- Do not perform the connections other than the following 6 types.
- Do not perform star-burst connection.
- In the diagram below, each station is described as follows.



<Master station>



<Slave station>

○ Connection port

● Connection port (for a terminal station)

* On a terminal station, turn on the terminal station setting switch.

5.2.1 Connection Pattern A

1 transmission line (using port I only), 1 path

- The terminal station is the master unit (port 1) and the slave station at the end.
- The connection using the port II only is not possible.

Master unit (Master station)

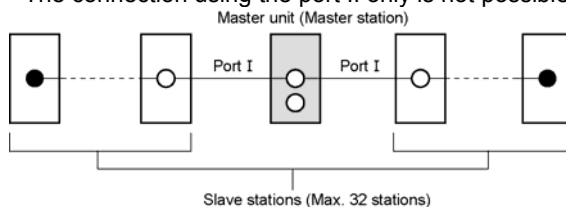


Note) FP2 Multi-wire Unit has the port I only.

5.2.2 Connection Pattern B

1 transmission line (using port I only), 2 paths

- The terminal stations are the slave stations at the both ends of each paths.
- The connection using the port II only is not possible.



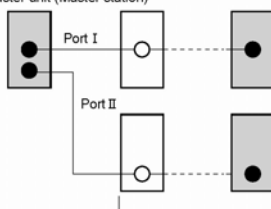
Note) FP2 Multi-wire Unit has the port I only.

5.2.3 Connection Pattern C

2 transmission lines (using port I and port II), 1 path each

- The terminal station is the master unit (ports I and II) and the slave station at the end of each transmission line.

Master unit (Master station)

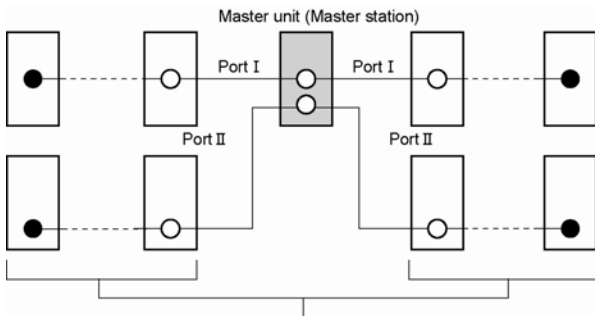


Note) FP2 Multi-wire Unit has the port I only.

5.2.4 Connection Pattern D

2 transmission lines (using port I and port II), 2 path each

- The terminal stations are the slave stations at the both ends of each transmission line.

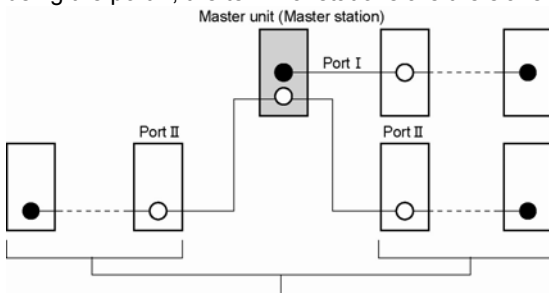


Slave stations (Max. 32 stations: including the port I and port II systems) Note) FP2 Multi-wire Unit has the port I only.

5.2.5 Connection Pattern E

2 transmission lines (using port I and port II), 1 path for the port I, 2 paths for the port II

- When using the port I, the terminal station is the master unit and the slave station at the end. When using the port II, the terminal stations are the slave stations at the both ends of transmission lines

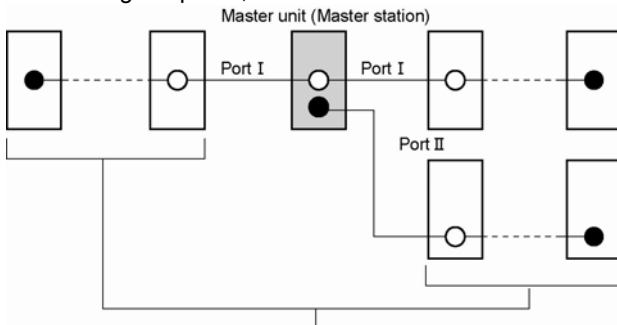


Slave stations (Max. 32 stations: including the port I and port II systems) Note) FP2 Multi-wire Unit has the port I only.

5.2.6 Connection Pattern F

2 transmission lines (using port I and port II), 2 paths for the port I, 1 path for the port II

- When using the port I, the terminal stations are the slave stations at the both ends of transmission lines. When using the port II, the terminal station is the master unit and the slave station at the end.



Slave stations (Max. 32 stations: including the port I and port II systems) Note) FP2 Multi-wire Unit has the port I only.

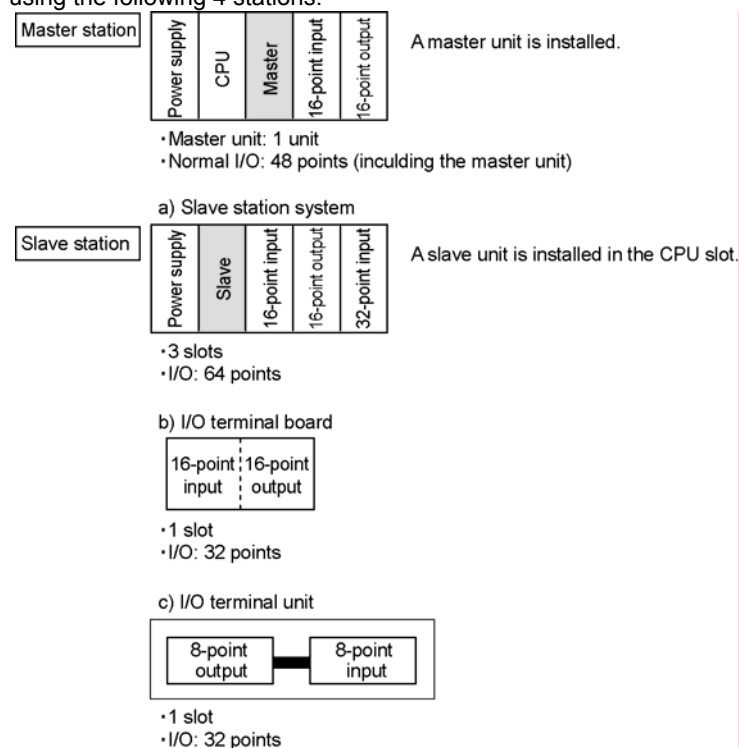
5.3 Procedure for Connecting and Setting Up

The connection and setting procedure of the remote I/O system [MEWNET-F] is described as follows.

5.3.1 Preparation

Turn OFF all power supply to devices.

Configure the master stations and slave stations. This section describes an example of the procedure using the following 4 stations.



Install each station at prescribed positions.

Configure a system which performs the remote I/O control with a master unit, 3 stations, 5 slots and 128 I/O points.

This CPU controls the normal I/O area and remote I/O area with totally 8 slots and 176 I/O points.



Reference: For information on the installation of master station system and slave station system, <FP3/FP10SH/FP10S Hardware Manual ARCT1F300E-1>

Master Station (Master Unit)	Max. 4 units/1 CPU
Slave station	Per 1 master unit (1 path) - Max. 32 stations - Max. 64 slots Per 1 CPU - Max. 128 slots



Note:

If the system is not properly configured, an error will be detected when the power is turned on.

[E35] There are units which cannot be installed on a slave station system.

[E36] Number of slots or number of I/O points is out of range.

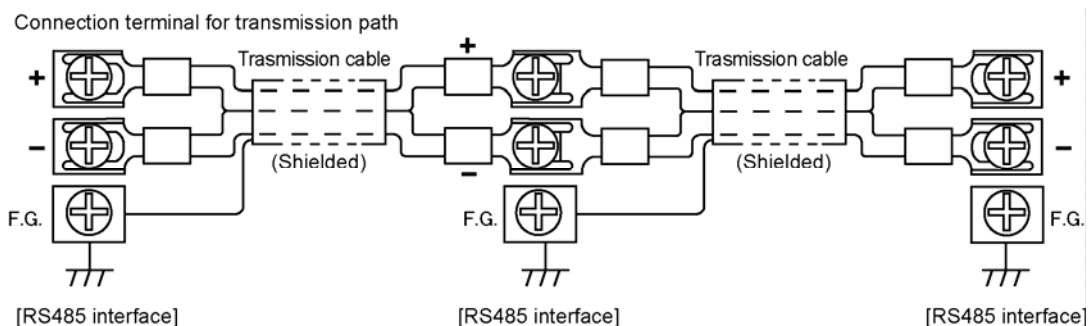
5.3.2 Procedure 1 Wiring of Transmission Cables

Connect each station with transmission cables (2-wire cables).

For transmission cables, use a twisted pair cable or VCTF 0.75 mm² x 2C (JIS) or equivalent. The length of transmission cables should not be longer than the maximum transmission distance (from a terminal station to a terminal station) for each transmission line.

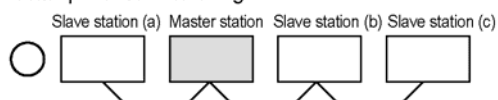
Connection method

1. Connection and wiring should be carried out from the master unit.
2. Wiring should extend from one unit to the next. Never run two wires from a single unit to two other units.
3. When connecting the RS485 interface of each station, be sure to connect positive (+) to positive, and negative (-) to negative. (Refer to the figure below.)
4. Connect one end of the shielded line of the transmission cable to the F.G. terminal, and ground it. (Refer to the figure.)

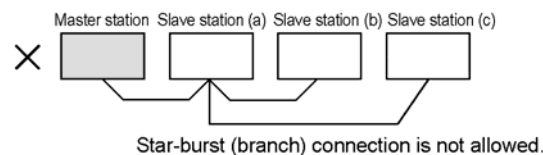
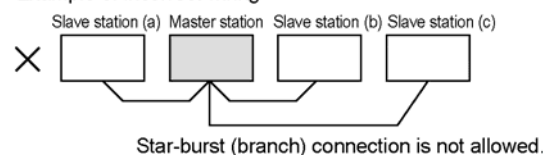


Example of wiring

• Example of correct wiring



• Example of incorrect wiring



The left figure is the "Connection pattern B". When connecting one transmission line, use the port I for the master unit.



Reference: For information on the maximum transmission distance,
<3.4 Transmission Cable Specifications>

5.3.3 Procedure 2 Master Station (Master Unit) Setting

Set the master unit.

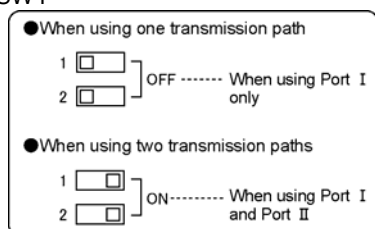
Note) The setting for FP2 Multi-wire Link Unit is different.



Reference: <FP2 Multi-wire Link Unit ARCT1F284 2.2>

Selecting a transmission port (transmission line)

Select a transmission port to be used and make the setting. Set the mode selector switches "SW3 & SW4"



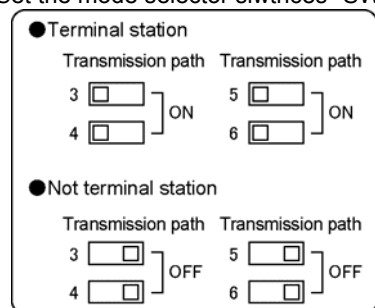
Set the mode selector switches "SW1 & SW2" to OFF as connection example.

Configuring a terminal station

When a slave unit is located at the end of a transmission line, the unit must be configured as a terminal station.

Setting method

Set the mode selector switches "SW3 & SW4".

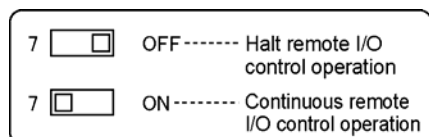


Set the mode selector switches "SW3 & SW4" to OFF as connection example.

If the terminal stations are not properly configured, the ERROR LED on the CPU will be turned on when the power is turned on. (Self-diagnostic error code E51). Turn on the power again after making the correct setting.

Selecting an operation mode during a communication error

Select whether to stop or continue the MEWNET-F control configured by this master unit when a communication error occurs. Set the mode selector switch "SW7".



Reference:

The operation mode when a communication error occurs is related to the setting for the CPU of the master station.

For the details of operation status, <7.2 Remote I/O Control When an Error Occurs>

5.3.4 Procedure 3 Slave Station Setting

Set slave stations (such as a system which a slave unit is installed, I/O terminal board and I/O terminal unit).

Setting the slave station number

Note the followings when setting the station numbers for slave stations.

Up to 32 stations can be connected to one master unit (station number range: 01 to 32). However, the total number of I/O points should not be more than 1024 points.

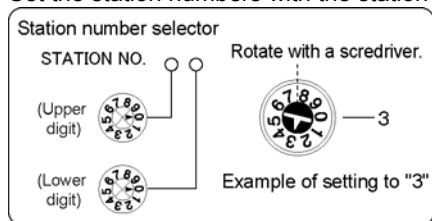
Do not use the same station number as the other slave stations connected to the same master unit. (The same station number can be used when the connected master unit is different.)

I/O numbers are allocated from the smallest station number in ascending order.

Note) If any number other than 01 to 32, an error will occur and the remote I/O control cannot be performed. When a setting error occurs, the ALARM LED on the slave station flashes.

Setting method

Set the station numbers with the station number selectors (rotary switches).



Note1) The station numbers are not necessarily set in the order of connection.

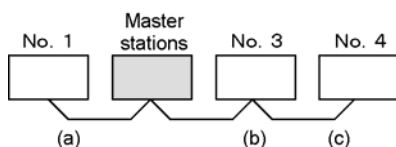
Note2) It is no matter if there are blank station numbers.

Setting example

Set the slave station (A) indicated in "Procedure 1" to the slave station number 1,

set the slave station (B) to the slave station number 3,

set the slave station (C) to the slave station number 4.



The I/O numbers are allocated for (A), (B) and (C) in that order. Refer to "Procedure 4" for information on the I/O numbers.



Reference:

For the details of manifold solenoid valves manufactured by various companies, also refer to respective manuals.

For information on the allocation of I/O numbers, <Chapter 6 Remote I/O Map>



Note:

Do not rotate the station number selectors after turning on the power supply.

Changing the station numbers will not affect in operation as the control is performed with the station numbers when the power turned on, however, it will cause an error in the next startup.

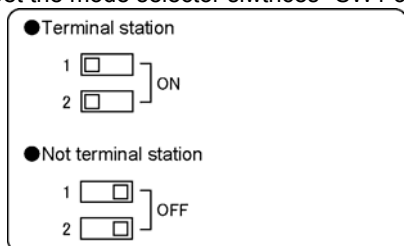
Configuring a terminal station

When a slave unit is located at the end of a transmission line, the unit must be configured as a terminal station.

In the example described in "Procedure 1", the slave stations (A) and (C) are the terminal stations.

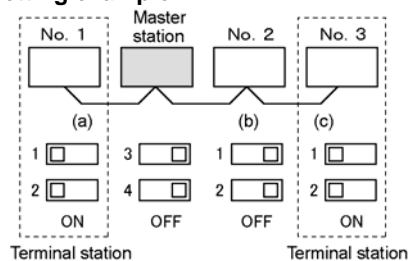
Setting method

Set the mode selector switches "SW1 & SW2".



If the terminal stations are not properly configured, the ERROR LED on the CPU will be turned on when the power is turned on. (Self-diagnostic error code E51). Turn on the power again after making the correct setting.

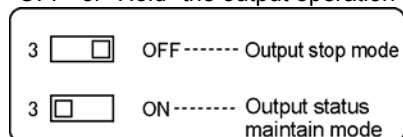
Setting example



For the slave station which is not a terminal station, set the mode selector switches "SW1 & SW2" to OFF.

Setting the output status during a communication error

The operation status of the slave unit when a communication error occurs is selected whether to turn "OFF" or "Hold" the output operation with the mode selector switch "SW3".



5.3.5 Procedure 4 Power Up Sequence

Turn on the power to the system after completing the installation of the master and slave stations, wiring with transmission cables and settings of station numbers and terminal stations.

Once the power turns on, the remote I/O control will be enabled, and the operation can be confirmed.

(The settings on the CPU such as the I/O number allocation are available.)

Confirming the power up and remote I/O control

Procedure

1. Power up the remote I/O controlled slave stations.
2. Set the CPU on the master unit to PROG. mode.
3. Power up the master station system as the last step.

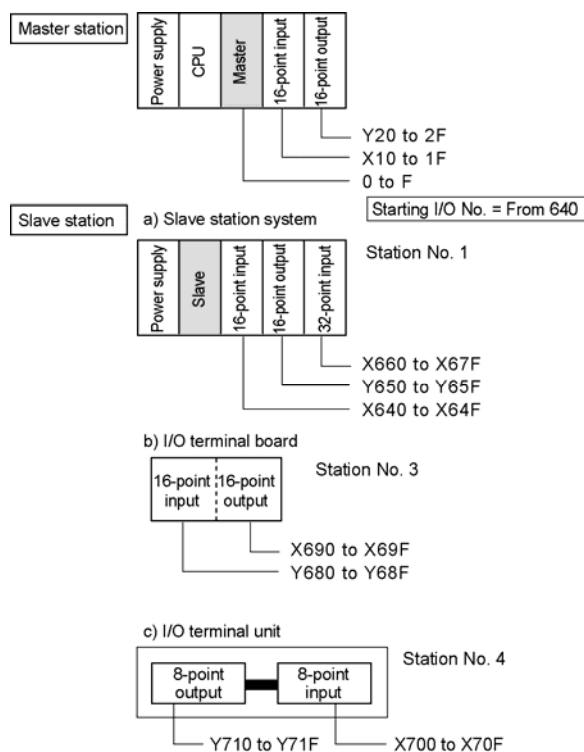
Note1) When you power up the master station, the COMM. LED (COM. LED) of all the stations will flash quickly. Please confirm.

Note2) When the PROG. LED on the CPU is flashing, the remote I/O map may be already registered.

Confirmation

When a remote I/O map has not been registered in the CPU, I/O numbers are allocated automatically only for the slave stations which have been turned on. (This is called the remote I/O control using "Automatic allocation".)

(1) When starting up the system in the above procedure, the I/O number allocation using "Automatic allocation" is as follows in the "Procedure 1" example.



-The left example is a case that various settings such as I/O map and base word number are the default values.

-Master station: Master 1

Base word number: 64

* The starting number for the I/O numbers of slave stations in the master 1 system is 640.

(2) The operation turning on/off the I/O of each station can be confirmed by writing a sequence program to the CPU of the master station or performing forced input/output.



Reference: <Chapter 6 Remote I/O Map>, <7.3 Slave Station Connection Confirmation Mode>

Assigning and registering remote I/O numbers

A remote I/O map (I/O numbers which are allocated for the remote I/O system [MEWNET-F]) can be registered in the CPU.

If registering a remote I/O map,

- Even if there is a slave station which is not activated when the master unit is turned on, the remote I/O map (remote I/O number allocation) will not be changed.

It is possible to wait to execute a program until all slave stations are turned on.

When you use the tool software, I/O numbers can be allocated arbitrarily.

- When you plan to add slave stations in future, you can allocate I/O numbers for them ahead of time.

- When a large number of remote I/Os are controlled, the memory area used for remote I/O control can be expanded.

Setting method

To register a remote I/O map, use a programming tool.

Use the FP programmer. (only when registering by the automatic allocation)

OP-52 operation

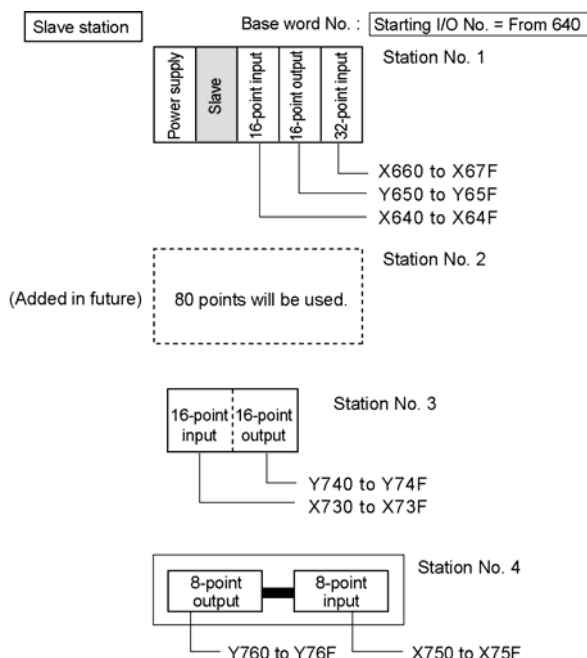
Use a tool software.

Remote I/O allocation

Note) Refer to the operation manuals for each programming tools.

Example of I/O allocation

[When you plan to add a slave station number 2 (uses 80 I/O points)]



The left figure is an example allocating remote I/O numbers arbitrarily..

It is also possible to change the base word number (default: 64).

The area, 680 to 72F is not used (which is used for the slave station number 2 to be added). The area, 680 to 72F, will be allocated when the slave station number 2 is added.

Once a remote I/O map has been registered, for example, the slave station number 4 is always controlled in the areas, X750 to X75F and Y760 to Y76F.



Reference: <Chapter 6 Remote I/O Map>, <7.3 Slave Station Connection Confirmation Mode>



Key Point:

An I/O map will be backed up once it has been registered.

The I/O map will be accepted when the master station system is turned on. Therefore, the operation according to the registered map will be performed when the power is turned on next time.

Settings of CPU

By setting the system registers of the CPU, you can change the remote I/O operation mode. Set according to the operation mode.

The system registers related to the MEWNET-F are as follows.

No. 27	CPU operation status when a communication error occurs.
No. 28	I/O error in the remote I/O slave station
No. 35	Confirmation of the connection of a slave station
No. 36	Selection of remote I/O update method

To set the system registers, use the FP Programmer or a tool software. For the details, refer to the operation manuals for each programming tool.



Reference:

For information on the registers numbers 27 and 28, <7.2 Remote I/O Control When an Error Occurs>

For information on the registers number 35, <Chapter 6 Remote I/O Map> and <7.3 Slave Station Connection Confirmation Mode>

For information on the registers number 36, <7.3 Remote I/O update Timing Method>



Key Point:

A system register setting will be backed up once it has been registered.

Chapter 6

Remote I/O Map

6.1 Remote I/O Map

Input/Output of the remote I/O system slave stations are controlled with I/O numbers, as well as the input/output in an ordinal system. This I/O number allocation on the remote I/O system [MEWNET-F] is called "Remote I/O map".

This chapter describes the allocation of I/O numbers for slave stations.

6.1.1 Configuration of Remote I/O Map

I/O numbers are allocated for slave stations as follows.

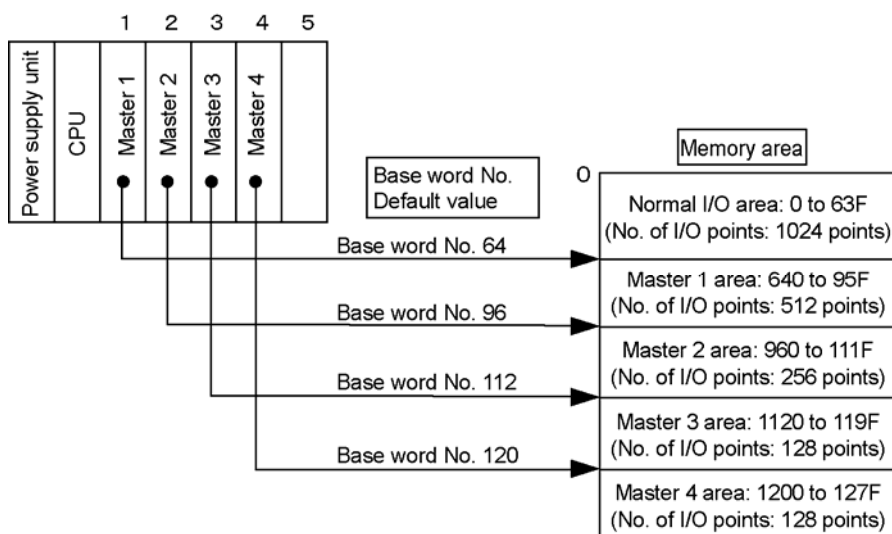
1. Remote I/O numbers are allocated in order from the starting address which is assigned to the master unit. The starting address is called the "Base word number". A maximum of 4 master units can be installed on one master station. Starting from the master unit closest to the CPU, the master units are called "Master 1", "Master 2", "Master 3" and "Master 4".

I/O numbers are allocated starting with a slave station with the lowest station number. Station numbers can be assigned independently of the connection order. I/O numbers are also allocated in the order of station numbers independently of the connection.

3. I/O numbers are automatically allocated according to the above conditions. (When using the automatic allocation mode)

Using the tool software, you can reallocate the base word number, or allocate I/O numbers arbitrarily independently of the connection.

The usable I/O points for each path when the base word number is the default are as follows.



If number of I/O points is large, changing the base word number with the tool software enables the area used for the path that needs many I/O to be expanded and other areas to be reduced.

6.1.2 Precautions When Allocating I/O Numbers for Slave Stations

The starting I/O number for a station is the next number of the last I/O number for the previous station number. The last I/O number of a station is determined according to the number of occupied I/O points. For the station with the smallest station number, the starting I/O number is determined according to the base word number.

FP2/FP3 slave station system (Slave unit)

Remote I/O numbers are allocated according to the I/O numbers used by the input/output units and advanced unit installed on the master backplane. I/O numbers are allocated starting from the I/O unit which is closest to the slave unit.

I/O Terminal Board

For FP I/O terminal board with MIL connectors and terminal block (transistor output), I/O numbers are allocated in the order of 16 input and 16 output (32 points in total).

For the terminal block type [Relay output], 16 input and 16 output are used. However, the actual I/O numbers which can be controlled by the master unit are 16 input and only 8 output. The highest 8 output points (Y*8 to Y*F) can be used as internal relays.

I/O Terminal Unit

The number of I/O points used by an FP I/O terminal unit will vary, depending on the combination of units.

Combination of units	I/O allocation
Input primary unit	16X
Output primary unit	16Y
Input primary unit and input expansion unit	32X
Output primary unit and output expansion unit	32Y
Input primary unit and output expansion unit	16X16Y
Output primary unit and input expansion unit	16X16Y

Note1) 16 points are used by the 8-point unit. In case of output units, the highest 8 output points (Y*8 to Y*F) can be used as internal relays.

Note2) When using the units in combination, the I/O numbers are allocated as follows; Starting with the primary I/O terminal unit when both of the units are the same I/O type.

Note3) Starting with the input type I/O terminal unit when the I/O types of two units are different.

When adding an input type expansion I/O terminal unit to an output type primary I/O terminal unit, the I/O numbers which are allocated will be changed.



Reference: For information on the allocation of I/O numbers, refer to respective user's manuals for each device.

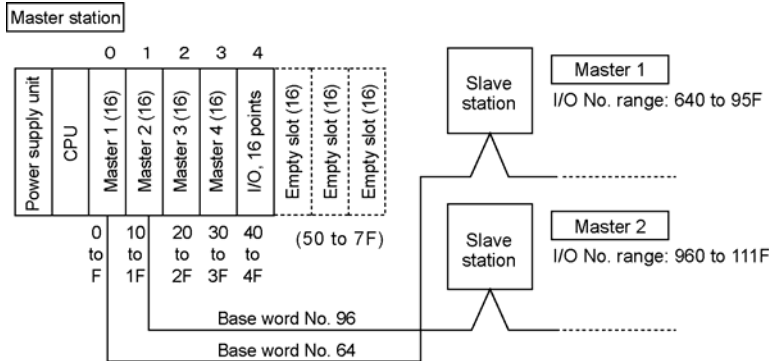
Example of I/O number allocation

With the tool software, the I/O numbers of master station system can be changed.

A master unit automatically uses 16 points. It can be changed to "0" point (0SE).

An empty slot can be changed to use "0" point (0E).

The reallocation of I/O numbers will not affect I/O allocation for slave stations.

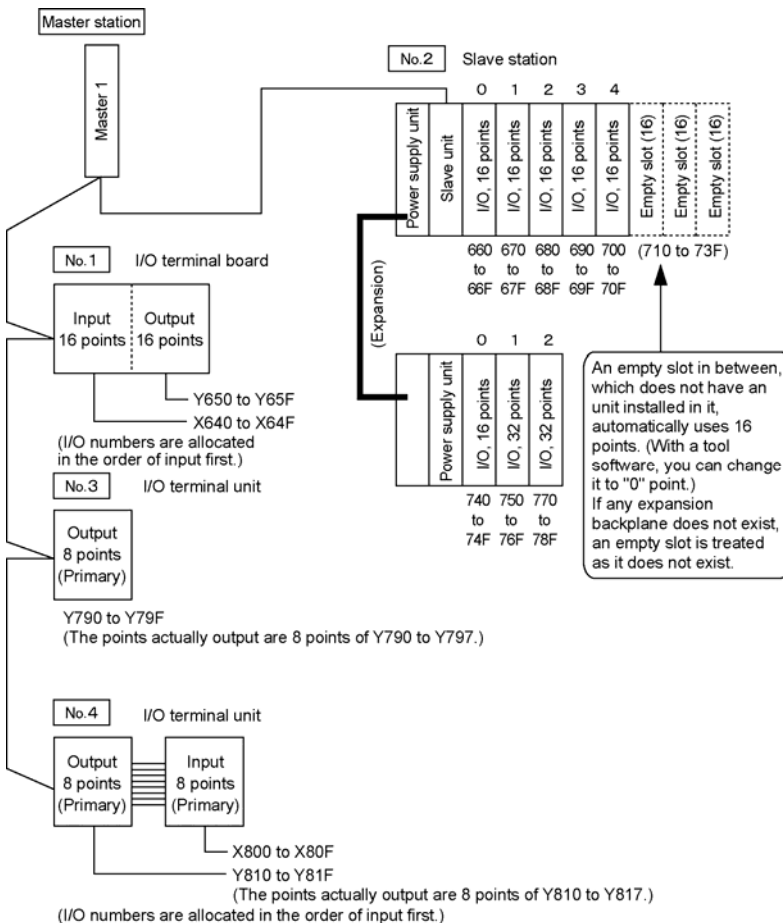


Example of remote I/O allocation

With the tool software, the remote I/O allocation can be changed.

An empty slot can be changed to use "0" point (0E).

The reallocation of I/O numbers will not affect I/O allocation for the master station system.



6.2 Automatic I/O Number Allocation and Arbitrary I/O Number Allocation

Remote I/O map is the allocation of I/O numbers for slave stations that will be accepted by the CPU when the system powers up. The remote I/O control is performed according to the I/O map.

- 1) For controlling with the I/O map automatically allocated to the active slave stations when the CPU of the master station is turned on (Remote I/O control according to automatic allocation)
- 2) For controlling according to the I/O map that has been registered in the CPU (Remote I/O control according to arbitrary allocation)

When actually controlling devices, it is recommended to use the arbitrary allocation method.

6.2.1 Remote I/O Control According to Automatic Allocation

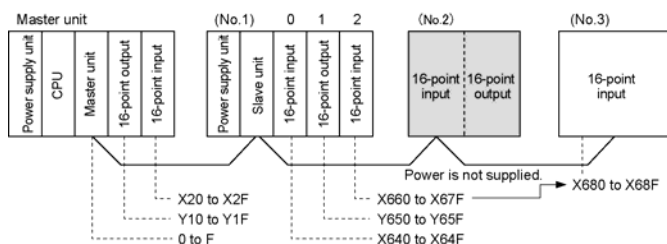
When the CPU at the master station is turned on and a remote I/O map has not been stored in the CPU, the I/O numbers are automatically allocated only for the slave stations which already have been turned on. The remote I/O control will be performed according to the remote I/O map. (The base word number is according to the setting.)



Note:

Remote I/O map has not been registered in the CPU with shipment. For the details of the registration method, refer to the next section.

If initializing the system register in the CPU, the remote I/O map registered will be also initialized. System registers are initialized using a programming device. When using the FP programmer; execute "OP-51". When using the FPDWIN GR; execute [Initialize] under [PLC Configuration].* Initialization of the remote I/O map registered in the CPU cannot be performed without the initialization of the CPU itself including system registers and base word numbers.



-In the example above, I/O terminal board No. 2 is not turned on. So, the CPU configures the remote I/O map only for No. 1 and 3. If slave station No. 2 is turned on after the CPU is turned on, the remote I/O map will not be reconfigured.

-Remote I/O control can be performed on a trial basis by partially making a connection during the system is being configured.



Note:

When allocating I/O numbers automatically, first turn on the slave stations to be controlled, then turn on the master station. If you turn on the slave stations after turning on the master unit, the CPU on the master station will not be able to control the slave station. The I/O for this slave station is skipped. Note that the I/O numbers of slave stations after this slave station are different from the case that this slave station has been turned on.

When terminal stations are not connected (caused by a broken wire or by a delay in applying power) to the master unit, a "Terminal station error" will occur. In this case, turn off the power supply of all the devices. Connect the terminal stations correctly and turn them on again.

6.2.2 Remote I/O Control According to Arbitrary Allocation

Register an arbitrarily allocated remote I/O map in the CPU. Remote I/O control will be conducted according to the registered I/O map. (The base word number is according to the setting.)

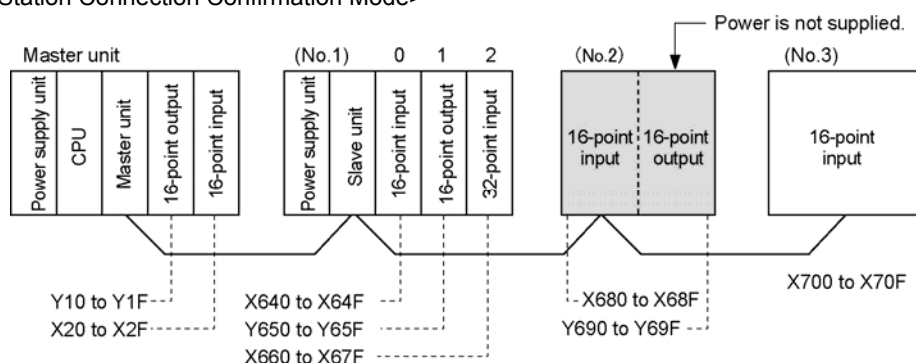
Even if there is a slave station which is not activated when the master unit is turned on, the remote I/O map (remote I/O number allocation) will not be changed.

Any slave stations activated after the master unit is turned on will be controlled by the master unit after it is activated.

When you select the "Confirmation mode for connection of slave station" (system register No. 35) in the CPU, the CPU controls the input/output after all of the slave stations which have been registered in the CPU are turned on.



Reference: For information on the "Confirmation mode for connection of slave station", <7.3 Slave Station Connection Confirmation Mode>



In the example above, slave station number 2 is not activated or connected. However, when it is turned on, it will be controlled according to the remote I/O map registered in the CPU.



Note:

Once the I/O map has been registered, the control will not be performed correctly in case of configurations with different registrations.

-When remote I/O number registration is not done correctly for a FP I/O terminal board, FP I/O terminal unit or FP I/O link unit, an "I/O terminal board registration error" will occur.

-When "Confirmation mode for connection of slave station" has been selected, even if there is no slave station registered in the CPU, the CPU will recognize that it has not been turned on yet. And the CPU will not start the operation until the registered station is installed and turned on.

How to register

Two types of registration of remote I/O maps are available.

Registration of the remote I/O map configured with automatic allocation

When the CPU at the master station is turned on and a remote I/O map has not been stored in the CPU, the automatically allocated map (refer to the previous section) will be registered as well as the normal I/O map (I/O allocation on the master station system).

[Procedure] 1. Select the system you want to register, and turn on the slave stations and then turn on the master station. (I/O numbers will be allocated automatically.)

2. Register the I/O numbers.

- When using the FP programmer; execute "OP-52".
- When using the FPWIN GR; execute "Remote allocation".

When using the FP programmer, do not confuse "OP-52 (I/O LAYOUT)" and "OP-51 (SYSTEM REG. INT)".
--

Registering an I/O map created using arbitrary allocation

A remote I/O map is arbitrarily created and registered independently of the installed condition or the normal I/O map.

[Procedure] Execute the [Remote I/O allocation] on the FPWIN GR.

- * You cannot register an arbitrary remote I/O map with the FP programmer.

6.3 Arbitrary Allocation of Remote I/O Map

A remote I/O map can be arbitrarily created and generated in the CPU with a tool software independently of the actual installation, and remote I/O control can be performed according to the I/O map. The precaution when creating a remote I/O map is described below.



Note:

You cannot register an arbitrary remote I/O map with the FP programmer.

For the details of the operation of the tool software FPWIN GR, creation and registration of I/O map, refer to "FPWIN GR Manual".

6.3.1 Setting the Base Word Number

The base word numbers can be independently reallocated for each master unit.

The I/O points necessary for each path can be kept, and the width of remote I/O memory area which is used for each master and the normal I/O memory area can be changed.

Setting range

0 to 511 for each master unit (word unit)

Note) It varies depending on the combination of the CPU unit and master unit.

[Example] When the base word number of master 3 is changed from 112 to 104, the slave station connected master 3 can be given with 256 I/O points (1040 to 119F). However, make the setting to meet the following restrictions.

Restrictions

(Last I/O number of normal I/O memory area) < (Base word number of master 1)

(Base word number of master 1) < (Base word number of master 2)

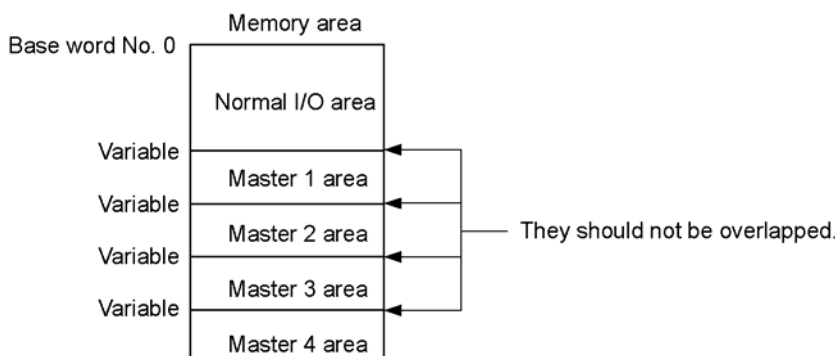
(Base word number of master 2) < (Base word number of master 3)

(Base word number of master 3) < (Base word number of master 4)

[Condition 1]

Set the base word number from a master unit that is closer to the CPU.

The base word number of a master unit at location remote from the CPU cannot be set to a value smaller than the base word number of a master unit that is closer to the CPU.



[Condition 2]

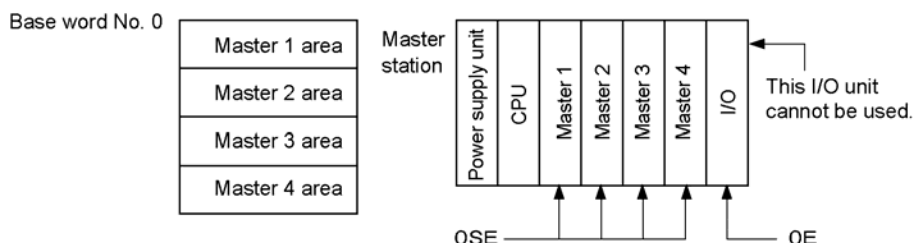
I/O numbers must be allocated so that no duplication will be occurred in the memory area. (e.g. an overlay of the master 2 and the master 3 area)

* If I/O maps are duplicated, "Remote I/O map overlap or range overflow error" (E37) will occur.

[Condition 3]

When the base word number of master 1 is changed to 0, all of the memory area is used for remote I/O. In this condition, the CPU cannot control the input/output units and advanced units with the master unit.

You must set the I/O point to "0SE" (advanced units), "0E" (I/O units) for all the units (including master units) on the backplane where the master unit is installed.



6.3.2 Setting the Number of Slots Used

The number of slots in a slave station can be reallocated.

-A maximum of 64 slots can be controlled by one master unit.

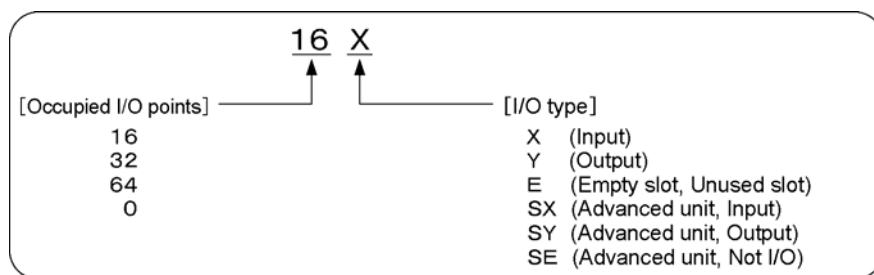
-When slave stations are configured with slave units, a maximum of 24 slots can be controlled. Specify the number including empty slots not the number of slots used.

* However, it is not necessary to treat 3-slot or 5-slot boards as a 8-slot board.

-The I/O terminal board and FP I/O terminal unit are set to use one slot each.

6.3.3 Setting the I/O Type and Number of Points

The I/O type and number of points for each slot can be independently reallocated. When "0E" is assigned to empty slots, I/O numbers are only allocated in sequence to the unit actually connected. So, no useless I/O numbers can be eliminated.



-A maximum of 4096 I/O points can be controlled by one master unit.

-The 8-point type I/O terminal unit uses 16 I/O points.

-For the details of the I/O type and the number of points occupied by an advanced unit, refer to the respective manuals.

Chapter 7

Operation Modes for Controlling MEWNET-F

7.1 How to Change the Operation Mode (System Register Setting)

7.1.1 Operation Mode Changeable

Remote I/O control when an error occurs

The operation mode when a transmission cable disconnected or a slave station does not work correctly can be set;

- whether to continue or halt the operation.
- whether to check the occurrence of error with the LEDs.

Confirmation for connection of slave station

When a remote I/O map is registered, you can start remote I/O control only after all of the slave stations which have been registered in the CPU are turned on.



Reference: For information on registering a remote I/O map, <Chapter 6 Remote I/O Map>

Remote I/O update timing

You can choose whether remote I/Os will be simultaneously updated with the normal I/Os or not. When a large number of I/O points are controlled, it will be a considerable amount of scan time for processing remote I/O. In this case, when you select "Scan time asynchronous mode", the normal I/O scan time can be shorter.

7.1.2 How to Change the Remote I/O Operation Mode

By setting the system registers of the CPU, you can change the remote I/O operation mode.

To set the system registers, use a programming tool.

When using the FP programmer: execute "OP-50".

When using the FPWIN GR: Set [Action on Error] and [Remote I/O setting] under [PLC Configuration].

* For the details of the operation mode setting procedure, refer to the FP programmer or the Tool software FPWIN GR.



Note: Precaution when changing the operation mode

To set the operation mode, the mode selector switch of CPU must be set to PROG. mode.

7.1.3 System Registers for the Remote I/O Operating Mode

Address (No.)	Item	Default	Description
27	Remote I/O control when a communication error occurs	0	0: Halt CPU operation 1: Continue CPU operation
28	Remote I/O control when an error occurs in a unit where a slave unit is installed on backplane	0	0: Halt CPU operation 1: Continue CPU operation
35	Slave station connection confirming mode	1	0: Release (Do not confirm) 1: Set (Confirm)
36	Remote I/O update timing method	0	0: Scan synchronous 1: Scan asynchronous

7.2 Remote I/O Control When an Error Occurs

The operation can be selected when an error occurs on [MEWNET-F].

Two types of error may occur in the remote I/O system.

Communication error

The master station and any slave station cannot communicate with each other. This may occur because the slave station is not turned on, or the communication cable may not be wired correctly.

Error occurs in the unit connected to a slave station system

When an input/output unit or advanced unit connected to the system where a slave unit is installed has produced an error because of a unit hangs or a system error, the error is detected.

You can check the operation status when an error occurs by examining the combination of the system registers in the CPU and the mode selector switches on the master unit.

Type		Setting
CPU	System register No. 27	Operation status when a communication error occurs
	System register No. 28	Operation status when any unit on the slave station has an error
Master unit	Mode selector switch FP2 Multi-wire Link Unit: SW1 FP3 Master unit: SW7	Remote I/O Control When an Error Occurs
Slave station	Mode selector switch FP2 Remote I/O Slave Unit: SW1 Other slave stations: SW3	Output status off the slave station when a communication error occurs Not hold (OFF)

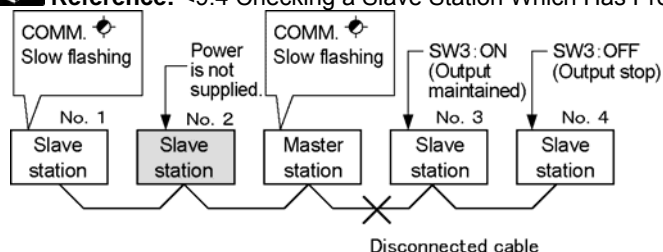
7.2.1 Operation Status When a Communication Error Occurs

"Communication error" is that the master station and any slave station cannot communicate with each other. This may occur because the slave station is not turned on, or the communication cable may not be wired correctly.

Note) When the error occurs, "Remote I/O communication error" (Self-diagnostic error code E46) will be detected. The slave stations that cannot be communicated can be confirmed by the special data registers DT9131(DT90131) to DT9137(DT90137).



Reference: <9.4 Checking a Slave Station Which Has Produced an Error>



In the example above, slave stations 2 through 4 cannot communicate with the master station.

1. Operation status of normal slave stations

When a communication error occurs, the following 4 types of operation can be selected for normal slave stations

○: Continue operation ×: Halt operation

Operation mode type	System register		Master unit SW1/ SW7 Note1)	Operation status when a communication error occurs		Steps to take
	No. 27	No. 28		Normal I/O	Remote I/O of slave stations Note3)	
1) I/O operation: Halt [1]	0	-	OFF	×	×	Restart the master station.
2) I/O operation: Halt [2]	0	-	ON	×	×	Initialize
3) Remote I/O operation: Halt	1	-	OFF	○	×	Restart the master station.
4) I/O operation: Continue	1	-	ON	○	○ (excluding disconnected stations)	If the cause of the error is removed, the slave station is automatically reconfigured and starts operation. Note2)

Note1) FP2 Multi-wire Link Unit: SW1, FP3 Master unit: SW7

Note2) The slave stations which have not been able to communicate will start the operation once the communication error is eliminated (such as connecting cables and turning on the power supply again).

Note3) COMM: COMM. LED(COM. LED) of slave stations

If the mode selector switch "SW7" is off (so that the master unit will halt remote I/O control when a communication error occurs), all of the slave stations will stop outputting data when an error occurs. This operation is not affected by the mode selector switch "SW3" setting.

The operations for each setting when a communication error occurs are described below.

1) I/O operation halt status [1]

- System register No. 27: 0 (Halt operation)
- Mode selector switch SW1/7: OFF (Halt operation)

[Operation]

- All I/O operation: Halt
- "COMM. LED(COM. LED)" on the normal master station and slave station: Slowly flashing (1-second cycle) (A communication error occurred.)

[Step to take]

Turn off the power supply to the master station. After eliminating the cause of the communication error (such as disconnected communication cable), power up again.

2) I/O operation halt status [2]

- System register No. 27: 0 (Halt operation)
- Mode selector switch SW1/7: ON (Continue operation)

[Operation]

- All I/O operation: Halt
- "COMM. LED(COM. LED)" on the normal master station and slave station: Flashing (at normal speed, 0.2-second cycle)

[Step to take]

After eliminating the cause of the communication error (such as disconnected communication cable), initialize the master station in the RUN mode.

3) Remote I/O operation halt mode

- System register No. 27: 1 (Continue operation)
- Mode selector switch SW1/7: OFF (Halt operation)

[Operation]

- Remote I/O operation: Halt/I/O operation of I/O units on master station: Continue
- "COMM. LED(COM. LED)" on the normal master station and slave station: Slowly flashing (1-second cycle) (A communication error occurred.)

[Step to take]

Turn off the power supply to the master station. After eliminating the cause of the communication error (such as disconnected communication cable), power up again.

4) Continue I/O operation mode

- System register No. 27: 1 (Continue operation)
- Mode selector switch SW1/7: ON (Continue operation)

[Operation]

- I/O operation of normal slave stations and normal I/O units in a master station: Continue
- "COMM. LED(COM. LED)" on the normal master station and slave station: Flashing (at normal speed, 0.2-second cycle)

[Step to take]

If the cause of the communication error (such as disconnected communication cable) is removed, the slave station is automatically reconfigured and starts operation.

However, since the "ERROR LED" on the CPU remains on, the initialize switch on the CPU must be set to be on in the RUN mode.

2. Operation status of a slave station which cannot communicate with the master station

Maintain the output status of a slave station which cannot communicate with the master station. Turn on the mode selector switch of the slave station.

When a communication error occurs while data is being output, the slave station continues to output the data.

If the mode selector switch is off, data output will stop when a communication error occurs.

* This operation is not affected by the setting of the CPU (such as system register No. 27 and the mode selector switch SW7 setting).

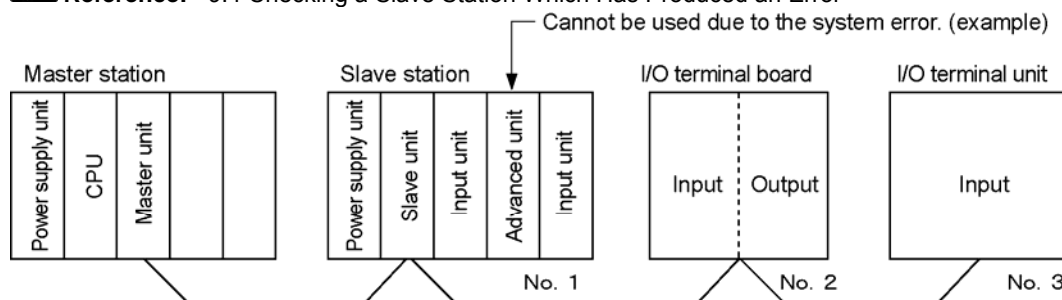
7.2.2 Operation When an Error Occurs in a Unit Connected to a Slave Station System

Select whether or not I/O operation will stop when an error occurs (such as a unit hangs or there is a system error) in any I/O unit or advanced unit installed on the master backplane.

Note) When the error occurs, "Remote I/O communication error" (Self-diagnostic error code E47) will be detected. The slave stations that cannot be communicated can be confirmed by the special data registers DT9131(DT90131) to DT9137(DT90137).



Reference: <9.4 Checking a Slave Station Which Has Produced an Error>



In the example above, an error has occurred in an advanced unit installed in the slot 1 of the slave station number 1. You can continue the I/O control for the normal units installed on the slave station number 1 as well as the slave stations number 2 and 3.

When an error occurs in a unit on the slave station system, the following 3 types of operation can be selected.

○: Continue operation ×: Halt operation

Operation mode type	System register		Master unit SW1 /SW7 Note1)	Operation status when a communication error occurs		Steps to take
	No. 27	No. 28		Normal I/O	Remote I/O of slave stations Note2)	
1) I/O operation: Halt	-	0	-	×	×	Restart the master station.
2 I/O operation: Continue [1]	0	1	-	○	○	Restart the master station.
	1	1	OFF			
2) I/O operation: Continue [2]	1	1	ON	○	○	Restart the slave station which has a unit that an error occurred.

Note1) FP2 Multi-wire Link Unit: SW1, FP3 Master unit: SW7

Note2) COMM: COMM. LED(COM. LED) of slave stations

The operations for each setting when a communication error occurs are described below.

1) I/O operation : halt

- System register No. 28: 0 (Halt operation)

Note) System register No. 27: 0 or 1, Undefined Mode selector switch SW1/SW7: ON or OFF, Undefined

[Operation]

- All I/O operation: Halt

- "COMM. LED(COM. LED)" on the normal master station and slave station: Flashing (at normal speed, 0.2-second cycle)

- Output state of all slave stations: OFF

[Step to take]

Turn off the power supply to the master station. Replace the faulty unit with a normal unit and power up again.

2) I/O operation : Continue

- System register No. 28: 1 (Continue operation)

- Mode selector switch SW1/7: OFF (Halt operation)

Note) System register No. 27: 0 or 1, Undefined

When the system register No. 27 is 0, it is OK to set the mode selector switch SW7 to ON.

[Operation]

I/O operation of the remote I/O and I/O units on the master station: Continue

I/O operation of normal I/O units and normal advanced units on a slave station system: Continue

[Step to take]

Turn off the power supply to the CPU. Replace the faulty unit with a normal unit and power up again.

3) I/O operation : Continue [2] (automatic reset)

- System register No. 28: 1 (Continue operation)

- System register No. 27: 1 (Continue operation)

- Mode selector switch SW1/7: ON (Continue operation)

[Operation]

I/O operation of the remote I/O and I/O units on the master station: Continue

I/O operation of normal I/O units and normal advanced units on a slave station system: Continue

[Step to take]

Power up the slave station system which has had a unit replaced and it automatically resets.

However, since the "ERROR LED" on the CPU remains on, the initialize switch on the CPU must be set to be on in the RUN mode.

Reference:

Set the operation mode when an error occurs using the system registers and the mode selector switches as below.

[Example]

When a communication error occurs, only the remote I/O control will stop. If a slave station is outputting data when the error occurs, the status will be maintained. If an error occurs in a unit on the slave station system, the operation will be continued.

[Setting]

- System register No. 27: 1

- System register No. 28: 1

- Mode selector switch SW1/7 on Master unit: OFF

- Mode selector switch SW3 on Slave unit: ON

7.3 Slave Station Connection Confirmation Mode

When the remote I/O system [MEWNET-F] is started (when the master station is powered up), it can be selected whether to start the operation after all registered slave stations have been connected or start the operation without waiting the connection of all registered slave stations.

- The factory default setting is set to "Slave station connection confirmation mode".
- It is set with the system register No. 35.
- For setting "Slave station connection confirmation mode", a remote I/O map must be registered. If no remote I/O map has been registered, "Slave station connection confirmation mode" is invalid although it has been set.



Reference: <Chapter 6 Remote I/O Map>

7.3.1 Slave Station Connection Confirmation Mode

Setting

System register No. 35: The operation will start after all slave stations are turned on.

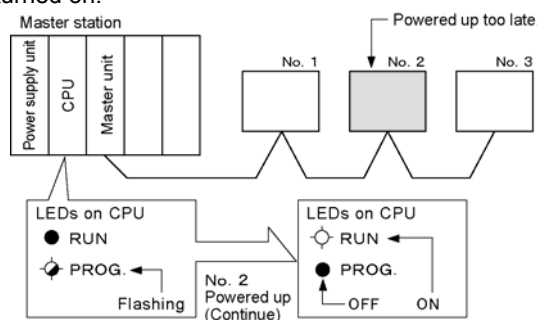
Timeout: Default: without timeout

Timeout can be set in the range of 0 to 255 seconds.

[Operation]

If there is any slave station which is not activated but it has been registered, the CPU will go to "slave station connection wait mode", and will not operate the remote I/O control (during this time, the PROG. LED on the CPU is flashing. The COMM. LEDs (or COM. LEDs) on the master unit and slave stations that have been activated are also flashing quickly to indicate the normal operation state).

Actual remote I/O control will be performed after all the slave stations registered in a remote map are turned on.



When setting the timeout, a self-diagnostic error E44 "Remote slave station connection timeout" will occur if a specified time elapses. The operation will be performed according to the setting of the system register No. 25.

Turn on the power to slave stations within a specified time.



Note:

The CPU goes to the slave station connection wait mode when

1. any slave station is not turned ON.
2. any communication cable is broken.
3. any slave station number is not correctly set in the remote I/O map.
4. the station number setting is not in the registered map.

Note) In case of the above 3 or 4, set the station number again, and turn off the power supply. Then turn on it again.

7.3.2 Slave Station Connection Not Confirmed Mode

Setting

System register No. 35: The operation begins in the slave station stand-by state.

[Operation]

Actual remote I/O control will be performed for the slave stations that have been activated when the mode selector switch on the CPU is set to RUN mode after turning on the master station.

If a slave station registered in a remote I/O map is powered up late, the remote I/O control will begin after the slave station is powered up.

7.4 Remote I/O Update Timing Method

if the normal I/O update (refresh) and remote I/O update (refresh) are performed after completing the scan of normal I/Os (on the master station) and remote I/Os, it will take a considerable amount of scan time for processing remote I/O as a large number of slave stations or I/O points are controlled.

Accordingly, a "Wait time" will be created on the I/O scan time.

In this case, when you select "Scan time asynchronous mode", the I/O will be updated (refreshed) without waiting for the completion of the scan for remote I/Os. Thus the wait time will be eliminated and the normal I/O scan time can be shorter.

- The factory default setting is set to "Scan time synchronous mode".
- It is set with the system register No. 36.
- "Scan time asynchronous mode" is effective when the normal I/O processing time (scan time) is shorter than the remote I/O processing time (scan time). When the remote I/O processing time is shorter than the normal I/O processing time, the I/O update (refresh) is synchronized with the normal I/O processing. So, even if the "Scan time asynchronous mode" is set, the timing is the same as the scan time synchronous mode.

7.4.1 Scan Asynchronous Mode

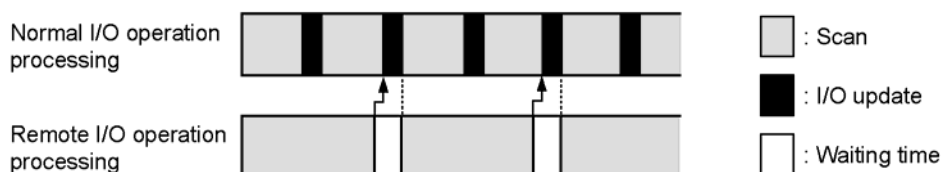
Setting

- System register No. 36: 1

[Operation]

- The normal I/O update (refresh) is performed after completing the processing of normal I/Os even if remote I/O processing has not been completed yet.
- The remote I/O update (refresh) is performed after completing the processing of remote I/Os.

- When the normal I/O processing time (scan time) is shorter than the remote I/O processing time (scan time)



7.4.2 Scan Time Synchronous Mode

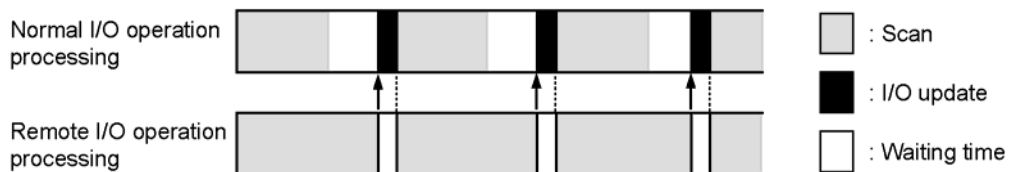
Setting

- System register No. 36: 0

[Operation]

- The normal I/O update (refresh) and remote I/O update (refresh) are performed after completing the processing of normal I/Os and remote I/Os.
- When it takes some time to process the remote I/Os, the total scan time will also take a certain amount of extra time.

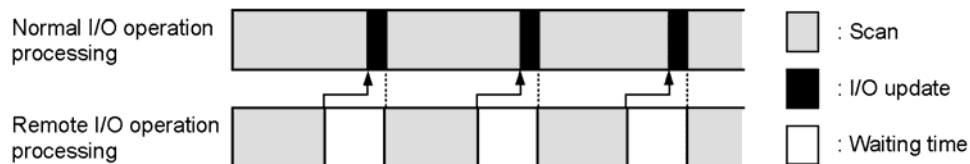
- When the normal I/O processing time (scan time) is shorter than the remote I/O processing time (scan time)



Reference:

When the remote I/O processing time is shorter than the normal I/O processing time, even if the "Scan time asynchronous mode" is set, the timing is the same as the scan time synchronous mode.

- When the normal I/O processing time (scan time) is longer than the remote I/O processing time (scan time)



Chapter 8

Control by MEWNET-F

8.1 Functions of MEWNET-F

The functions of the remote I/O system [MEWNET-F] are as follows.

- 1) Remote I/O Control
- 2) Memory access function

This chapter explains the overview of the functions and the usage.



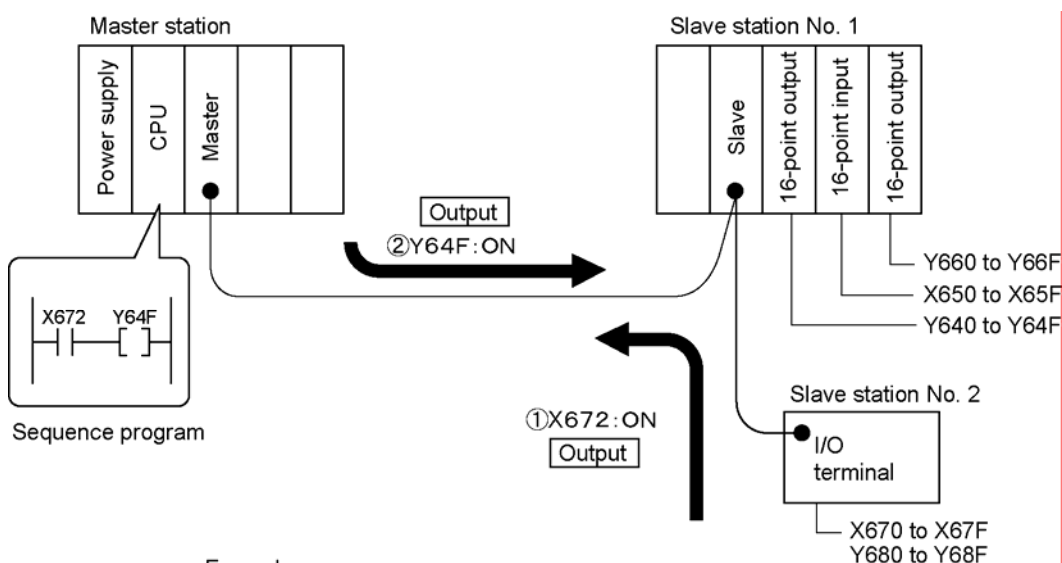
Note:

"Memory access" is a function that can be used between a master station and an advanced unit connected to a slave station system.

8.1.1 Remote I/O Control

The I/O of a slave station can be controlled on the CPU of the system (master station) which a master unit has been connected. This is called "Remote I/O control".

The remote I/O control function is made possible by transferring I/O information to a slave station according to the program in the CPU on a master station.



Example:
"Y64F" turns ON after "X672" turns ON.

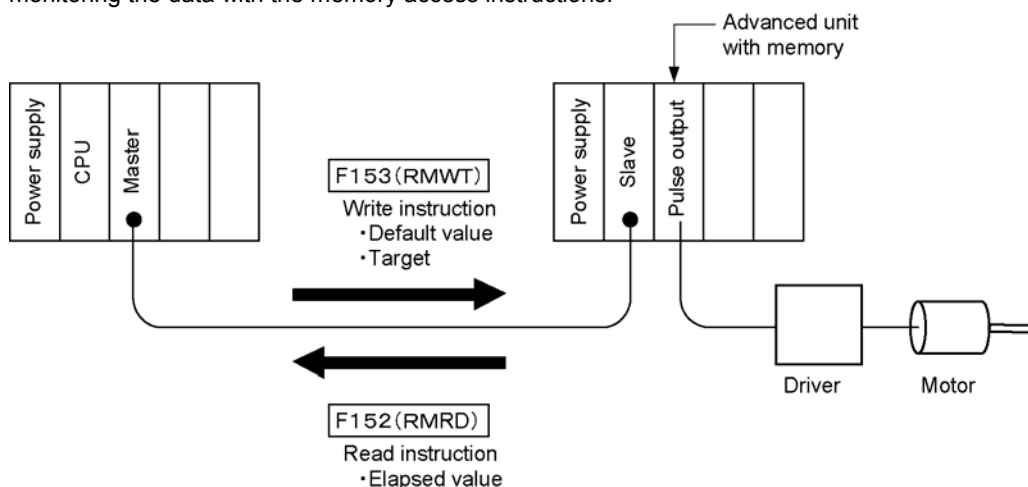
8.1.2 Memory Access Function

In the CPU on the master station, data can be written to and read from the memory in the advanced units on a slave station installed on the slave unit.

The high-level instructions of sequence programs F152(RMRD) and F153(RMWT) are used.

(These instructions are called "Memory access instructions" in this chapter.)

The figure below shows an example of writing the data for the pulse output unit from the CPU or monitoring the data with the memory access instructions.



Note:

- The maximum data length that can be written or can be read by the instructions given above is 32 words per instruction.
- While a memory access instruction is being executed (R9035: OFF), another memory access instruction cannot be executed.
- There are some differences in the operations between the normal memory access instruction F150/F151 and the memory access instruction F152/F153 for the advanced unit on a slave station. When executing the memory access instructions F152 or F153, note the following:

- When using F150 or F151:

When the instruction is executed, the actual processing will be done and it will be completed (it will take one scan cycle before the processing is completed).

- When using F152 or F153:

When the instruction is executed, data receive request or data send request is executed only for the slave station system. The actual processing will be done when the END instruction is executed. Therefore, it will take several scan cycles before the processing is completed. When you access the memory of the advanced unit, check the execution status by looking at the special relays and special data register.

- R9035: RMRD/RMWT instruction executable flag
- R9036: RMRD/RMWT instruction end flag
- DT9036(DT90036): RMRD/RMWT instruction end code
- For information on the memory (address), refer to the manual of an advanced unit with memory.

"Memory" is the memory that advanced units have. Data and parameters for setting operations to be used on advanced units are stored. Data can be read or written from the CPU.

1. Data read instructions (RMRD): Reads data from the slave stations

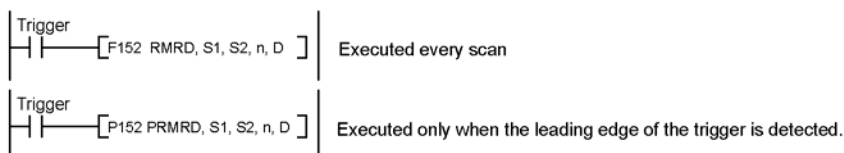
For reading the data from the specified advanced unit of the slave station, execute the instruction F152(RMRD) in a sequence program.

Reads the data from the specified advanced unit installed on the remote slave station system.	F152(RMRD)	Executed every scan
	P152(PMRD)	Executed only when the leading edge of the trigger is detected.

Description method of F152

The data read instruction from the memory is described as follows.

Basic style of instruction



S 1 : Lower 16-bit area of 32-bit block to specify the conditions of this instruction
S 2 : Starting address in the advanced units memory
n : Number of words to be read (Max. 32 words)
D : Starting 16-bit destination address where the data will be stored

Word unit														Index modifier	No. of steps
Set value	WX	WY	WR	WL	SV	EV	DT	Ld	FL	IX	IY	K	Constant H		
S 1	○	○	○	○	○	○	○	○	○	—	—	—	—	○	9
S 2	○	○	○	○	○	○	○	○	○	○	○	○	○	○	
n	○	○	○	○	○	○	○	○	○	○	○	○	○	○	
D	—	○	○	○	○	○	○	○	○	—	—	—	—	○	

■ Specification of control data "S1"

Specifies the target advanced unit.

	(Higher)	(Lower)
S 1	A	B
S 1 + 1	C	D

A : Specifies the master unit (system path)/range: 01H to 04H
B : Specifies the slave station No./range: 01H to 20H (No.1 to No.32)
C : Bank No./range: 00H to FFH
Without bank: 00H
D : Slot No./(specified with H constant)
range: 00H to 17H (No.0 to No.23)

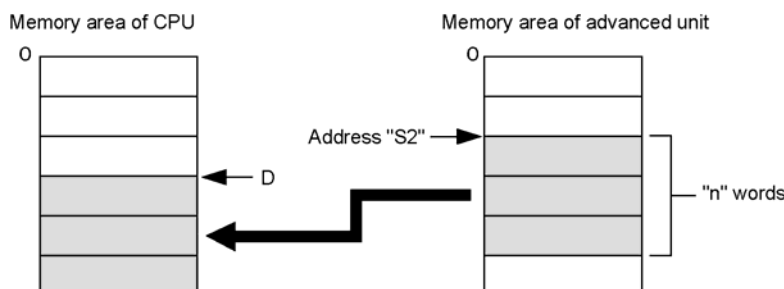
* All the backplanes are assumed to be as 8-slot type.

Reads the data from the advanced unit installed in the slot number "D" of the slave station "B" of the system path "A".

[Note] The unit number of the master unit that is located closest to the CPU of the master station should be 1, and then number the next units 2, 3, 4 in order.
For information on the bank, refer to the description of the memory of each advanced unit.

Execution:

"n" words of data starting with the address "S2" in the memory of the advanced unit specified by "S1", will be stored in the area of the CPU specified by "D".



The special relays and special data register are used for reading data from the memory in order to check the execution status due to the following reasons. While a memory access instruction is being executed, this instruction cannot be executed. The read data receive request is executed only by this instruction. The read operation will be executed when the end(ED) instruction is executed.

Special relays and special data register used for checking the execution status

Description	Relay number	Description
RMRD/RMWT instruction executable flag	R9035	0: Not executable (*) 1: Executable
RMRD/RMWT instruction end flag	R9036	0: Normal end 1: Abnormal end
RMRD/RMWT instruction end code	DT9036 (DT90036)	0: Normal end Other than 0: Abnormal end code

* The memory access instruction is being executed.

Flag operation

In the following cases, the error flags (R9007, R9008) will turn on.

- 1) When the data specified by S1+1 and S1 exceeds the limit.
- 2) When there is no master station.
- 3) When an address modifier error occurs.
- 4) When the read area exceeds the limit.



Note:

The error code stored in DT9036(DT90036) are as follows.

Code (HEX)	Description
5B _H	Time-out error: No destination exists and the state with no communication is continuing.
68 _H	Access area missing error: Specified memory access area does not exist in the unit on slave station.
71 _H	Response signal from a send operation cannot be received.
72 _H	Buffer of the master unit is full.
73 _H	Response command cannot be received.

When errors 71_H, 72_H, 73_H occur, the time-out error may occur. The set value of the time-out can be changed in 10 ms to 81.9 s by the system register No. 32. The default setting for FP3 is 2 s, and the one for FP2/FP2SH/FP10SH is 10 s.

2. Data write instructions (RMWT): Writes data to the slave stations

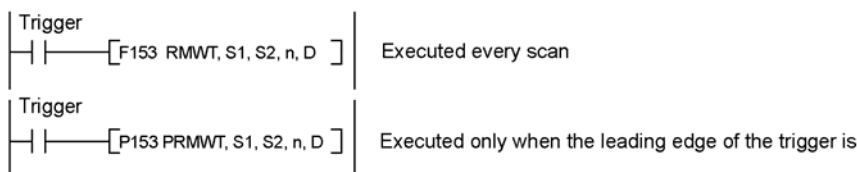
For writing the data to the specified advanced unit of the slave station, execute the instruction F153(RMWT) in a sequence program.

Writes the data to the specified advanced unit installed on the remote slave station system.	F153(RMWT)	Executed every scan
	P153(PRMWT)	Executed only when the leading edge of the trigger is detected.

Description method of F153

The data write instruction to the memory is described as follows.

Basic style of instruction



- S 1 : Lower 16-bit area of 32-bit block to specify the conditions of this instruction
S 2 : Starting 16-bit area (the source data is stored)
n : Number of words to be read (Max. 32 words)
D : Starting memory address number of advanced unit

Word unit														Index modifier	No. of steps
Set value	WX	WY	WR	WL	SV	EV	DT	L d	FL	IX	IY	K	Constant H		
S 1	○	○	○	○	○	○	○	○	○	○	—	—	—	○	9
S 2	○	○	○	○	○	○	○	○	○	○	—	—	—	○	
n	○	○	○	○	○	○	○	○	○	○	○	○	○	○	
D	○	○	○	○	○	○	○	○	○	○	○	○	○	○	

■ Specification of control data "S1"

Specifies the target advanced unit.

	(Higher)	(Lower)
S 1	A	B
S 1 + 1	C	D

- A : Specifies the master unit (system path)/range: 01H to 04H
B : Specifies the slave station No./range: 01H to 20H (No.1 to No.32)
C : Bank No./range: 01H to 03H (No.1 to No.3)
Without bank: 00H
D : Slot No./.(specified with H constant)
range: 00H to 17H (No.0 to No.23)

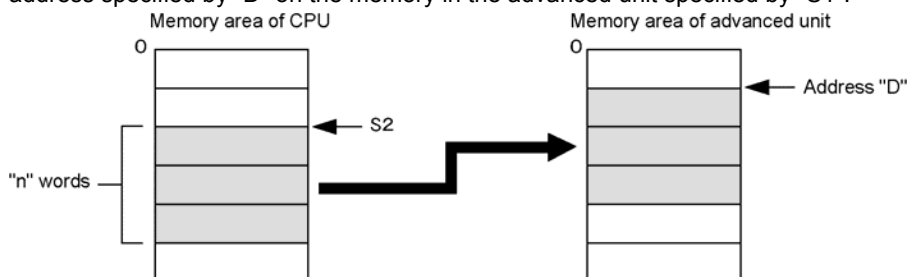
* All the backplanes are assumed to be as 8-slot type.

Reads the data from the advanced unit installed in the slot number "D" of the slave station "B" of the system path "A".

[Note] The unit number of the master unit that is located closest to the CPU of the master station should be 1, and then number the next units 2, 3, 4 in order.
For information on the bank, refer to the description of the memory of each advanced unit.

Execution:

"n" words of data starting with the address "S2" on the CPU will be written to the area starting with the address specified by "D" on the memory in the advanced unit specified by "S1".



The special relays and special data register are used for writing data to the memory in order to check the execution status due to the following reasons. While a memory access instruction is being executed, this instruction cannot be executed. The read data send request is executed only by this instruction. The write operation will be executed when the end(ED) instruction is executed.

Special relays and special data register used for checking the execution status

Description	Relay number	Description
RMRD/RMWT instruction executable flag	R9035	0: Not executable (*) 1: Executable
RMRD/RMWT instruction end flag	R9036	0: Normal end 1: Abnormal end
RMRD/RMWT instruction end code	DT9036 (DT90036)	0: Normal end Other than 0: Abnormal end code

* The memory access instruction is being executed.

Flag operation

In the following cases, the error flags (R9007, R9008) will turn on.

- 1) When the data specified by S1+1 and S1 exceeds the limit.
- 2) When there is no master station.
- 3) When an address modifier error occurs.
- 4) When the write area exceeds the limit.



Note:

The error code stored in DT9036(DT90036) are as follows.

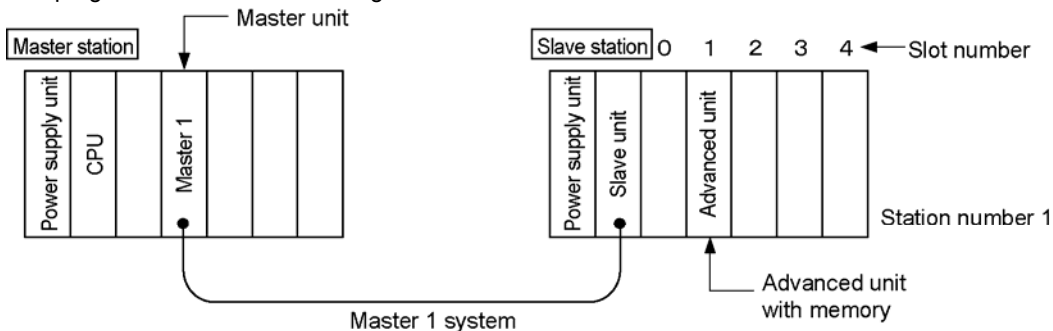
Code (HEX)	Description
5B _H	Time-out error: No destination exists and the state with no communication is continuing.
68 _H	Access area missing error: Specified memory access area does not exist in the unit on slave station.
71 _H	Response signal from a send operation cannot be received.
72 _H	Buffer of the master unit is full.
73 _H	Response command cannot be received.

When errors 71_H, 72_H, 73_H occur, the time-out error may occur. The set value of the time-out can be changed in 10 ms to 81.9 s by the system register No. 32. The default setting for FP3 is 2 s, and the one for FP2/FP2SH/FP10SH is 10 s.

3. Program examples

Advanced unit is installed on a master backplane together with a slave unit. Access the memory in the advanced unit from the CPU on its master station.

The program is based on the configuration shown below.



- Communication path: Master 1 (Connected to the master unit installed in the position closest to the CPU)
- Slave station number: Slave station number 1
- Installed location of advanced unit: Slot number 1 (Second slot)

In the example above, the control data (32-bit configuration) which is supplied for "Memory access instructions (F152 and F153)" can be expressed as follows.

	15 (Higher)	(Lower) 0
S 1	A	B
S 1 + 1	C	D

- A: Selection of master unit ----- 01H (Master 1 system)
 B: Specification of slave station No. ----- 01H (Station No. 1)
 C: Bank No. ----- 00H (Unit without bank)
 D: Slot No. ----- 01H (Slot No. 1)

Control data : S1 = "01010H"
 S1+1 = "0001H"



Note:

For example, when connecting the data (S1) to "Data register DT0", store the data (S1+1) in "Data register DT1".

Specify header address DT0 only for the memory access instruction.

Example 1: Simple memory access

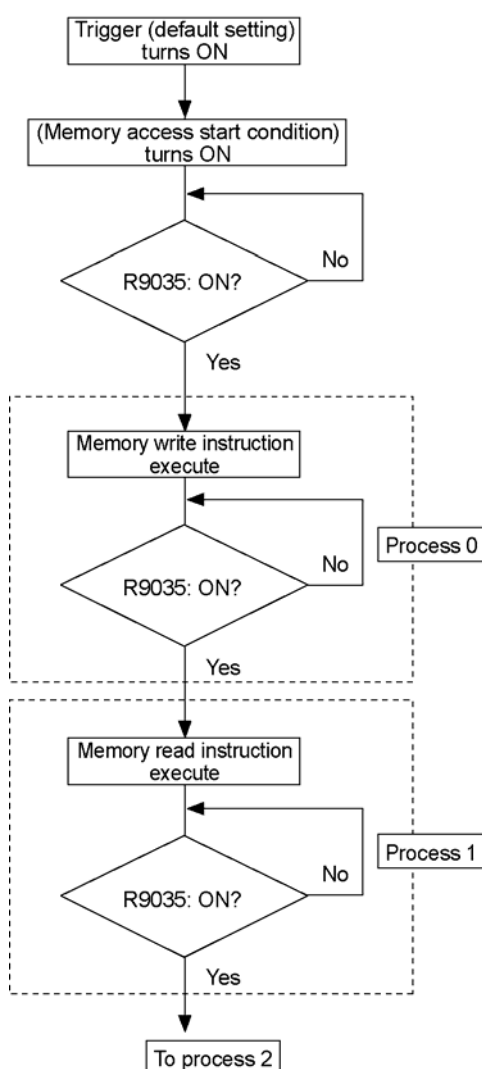
- 1) Write the data stored in DT100 through DT114 (15 words) of the CPU into the memory of an advanced unit on the slave station installed on the slave unit.
- 2) Read the data stored in the advanced unit, and store it to DT200 to DT214 of the CPU.

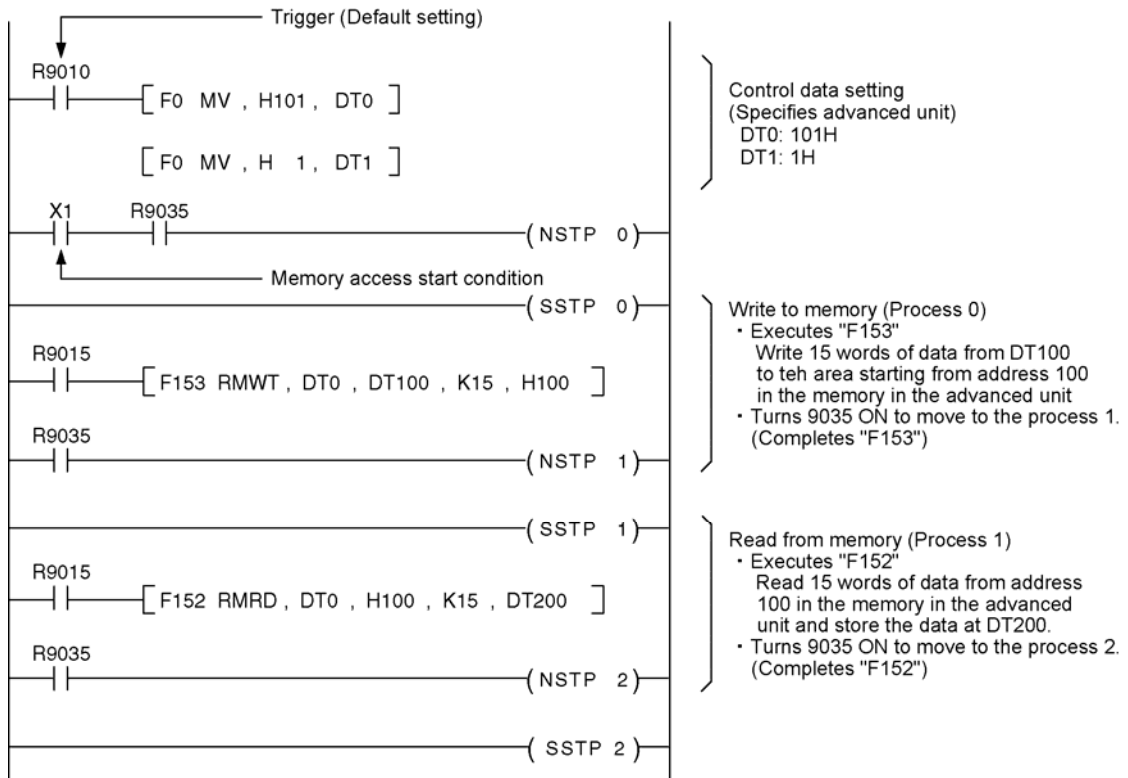
Program the above operation.

When programming, note the following.

Be sure to examine the program for memory access instructions so that the control transfers to the next access only while R9035 is ON.

[Flow chart (Simple memory access)]





Note:

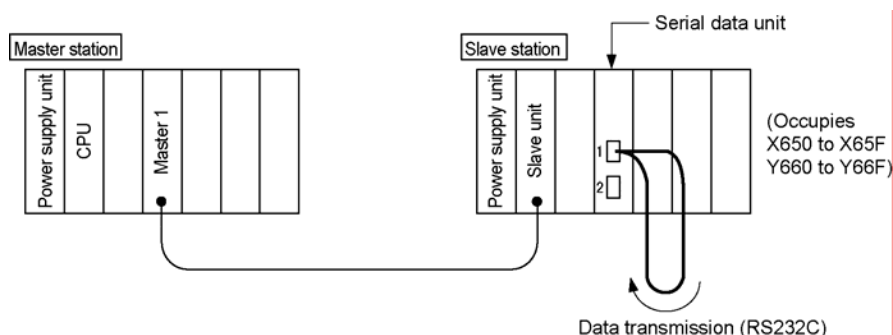
R9015 in the above program is a special relay which turns ON only for the first scan at the operation at the SSTP (Start step) instruction.

In the example program, R9010 (normally ON relay) is used for the trigger (default setting).

Example 2: Memory access with handshaking

Use a serial data unit to perform a self-looping communication via the RS232C interface "CH1". The unit performs handshaking using the input "X" contacts and output "Y" contacts for data communication.

- 1) Sending the data stored in DT100 to DT114 (15 words) of the CPU via CH1 of the serial data unit installed on slave station.
- 2) Data sent from CH1 will be received at the same CH1 of serial data unit.
- 3) Read the data received at the CH1, and the data will be stored in the DT200 to DT214 of the CPU.



Program the above operation.

When programming, note the following.

1. Be sure to examine the program for memory access instructions so that the control transfers to the next access only while R9035 is ON.

2. When you use a serial data unit on the [MEWNET-F], be sure to create the program taking the ON/OFF timing of the control relays (X or Y) into considerations.

(Example) Program for performing handshaking smoothly

There are some differences in the operations between the normal memory access instruction F150/F151 and the memory access instruction F152/F153 for the advanced unit on a slave station. When executing the memory access instructions F152 or F153, note the following:

Operation of F150/F151

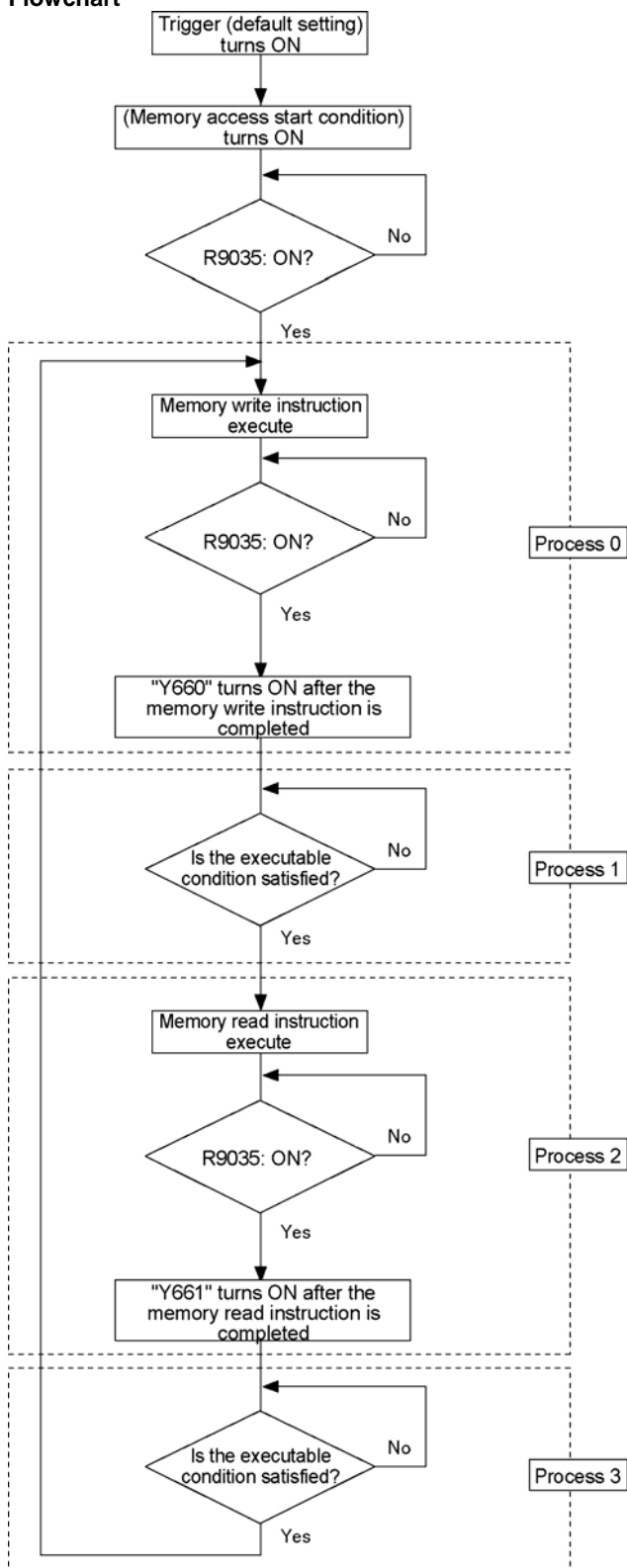
When an F150 or F151 instruction is executed, the CPU access to the advanced unit is performed at the moment that the instruction is executed. With this operation, the serial data unit's handshaking control can be performed with programming the control relays (X or Y) at the higher step address.

Operation of F152/F153

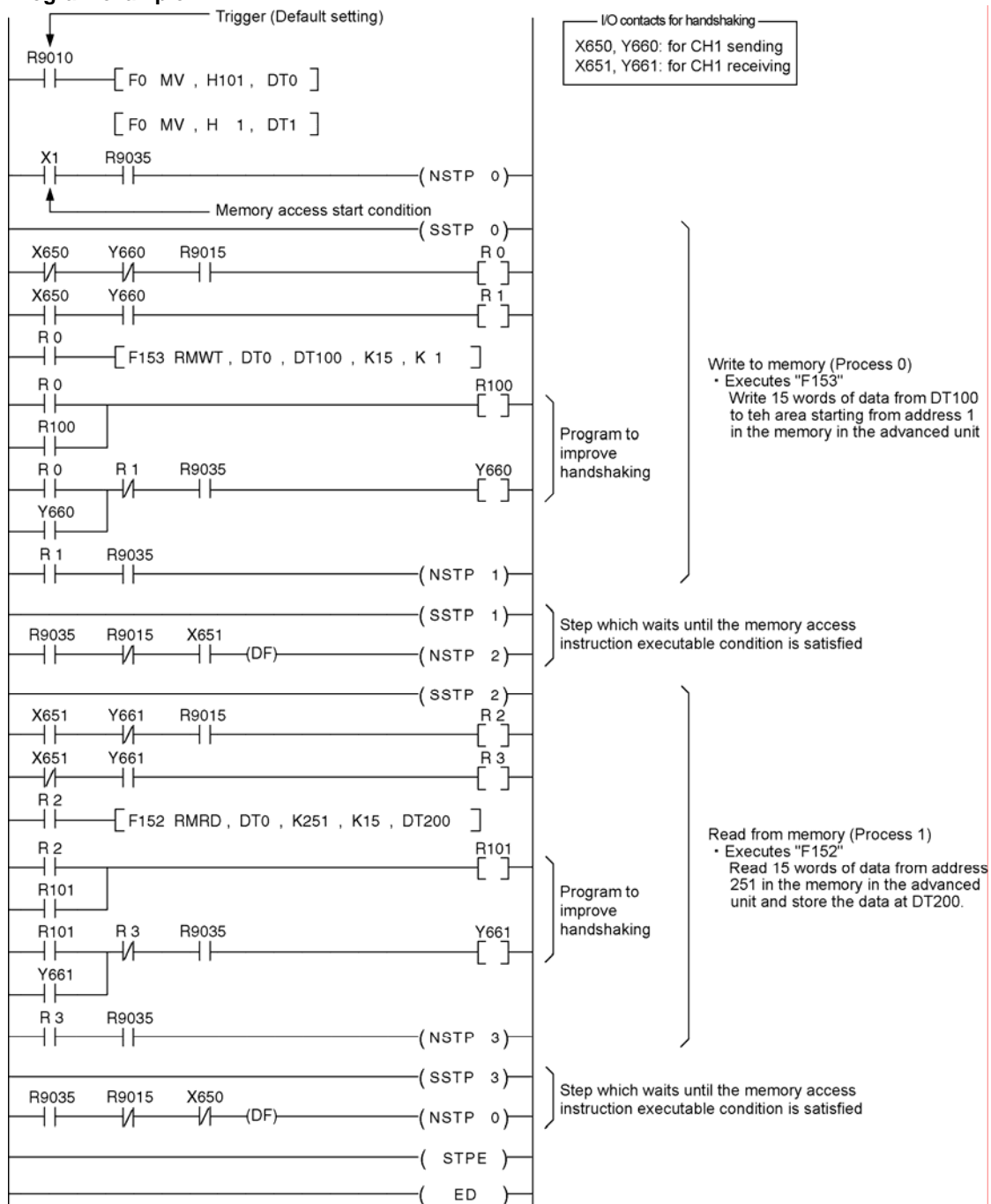
When an F152 or F153 instruction is executed, the CPU access to the master unit is performed at the moment. However, the data transfer between the master unit and the advanced unit are performed after the End instruction. While this operation, the serial data unit's handshaking control should be performed after the special relay R9035 turns ON.

3. Since two or more F152/F153 instructions can not be performed at one time, the program should be created not to execute two or more F152/F153 instructions at a time with using the special relay R9035 and step ladder instructions.

Flowchart



Program example



Note:

R9015 is a special relay which turns ON only for the first scan at the operation at the SSTP (Start step) instruction.

R9010 (normally ON relay) is used for the trigger (default setting).

Chapter 9

Troubleshooting

9.1 Finding the Cause of an Error and Correcting the Error

This chapter explains the method for troubleshooting and checking error states when using the remote I/O system [MEWNET-F].

9.1.1 Finding the Cause of an Error

Follow the procedure below to find the cause of an error and eliminate it.

1. Checking the LEDs

Check the "ALARM" and "COMM." (or COM.) LEDs on the master unit, slave unit and FP I/O terminal.

LED name	Status	Contents	Actions
ALARM	Lights:	Error in the unit or board.	Replace the unit/board with a new one.
COMM. (COM.)	Flashing slowly (1-s cycle)	A communication error (such as the disconnection of transmission cable or the power off of slave station) occurs on another station.	Check the transmission line and location, and take a proper step.
	Goes out:	Transmission error (Error in transmission cables or the terminal station setting, communication with a master unit cannot be performed.)	Check the error and take a proper step.

2. Determining what kind of error has occurred

When an error occurs, the self-diagnostic function will be activated and the type or source of the error will be able to be checked.

They will be stored in the special data registers DT9136(DT90136) and DT9137(DT90137).

3. Checking the communication path (for master 1 through master 4) on which an error has occurred

You can check which communication path has produced an error with the special data registers DT9136(DT90136) and DT9137(DT90137), and with the special internal relays R9058 to R905B.

4. Checking the slave station number of the slave station where an error occurs

You can check the slave station number in error with the special data registers DT9131(DT90131) and DT9135(DT90135).

9.2 Self-diagnostic Functions of MEWNET-F

When an error occurs when using [MEWNET-F], you can check the error with the self-diagnostic error codes.

Procedure

FP programmer: Execute "OP-110".

FPWIN GR: Execute [STATUS DISPLAY]. Error codes will be displayed on the screen. The description of error codes are as below

9.2.1 Self-diagnostic Error Table

Error code	Description	CPU operation	Actions
35	An illegal unit is installed on the slave station	Halt	An illegal unit is installed on the slave station. Remove the illegal unit.
36	Remote I/O usage limit	Halt	Number of slots, number of I/O points exceeds the limit. Use them within the limit.
37	Remote I/O map overlap or range overflow error	Halt	Reset the I/O map so that the assignments do not overlap.
38	FP I/O terminal board registration error	Halt	Correctly set the registration value in the I/O map for the FP I/O terminal board.
46	Remote I/O communication error <small>Note1)</small>	Selection <small>Note2)</small>	A communication error (such as the disconnection of communication path or the power off of remote slave station) occurs. Fix the source of the error. For the details of the method to check a slave station which has produced an error, refer to "14-4. Checking a Slave Station Which Has Produced an Error". (OP8 -> DT9131(DT90131) to DT9137(DT90137))
47	I/O attribute error on the slave station <small>Note1)</small>	Selection <small>Note2)</small>	Verification error or error in an advanced unit, etc Perform a check of the I/O unit. (OP8 -> DT9131(DT90131) to DT9137(DT90137))
51	Remote I/O terminal station error	Run	The setting of the terminal station for remote I/O is incorrect. Correctly set the terminal station again.
52	Remote I/O update synchronous error	Run	Please contact us.

Note1) You can check where the error has occurred by monitoring the special data register with a programming tool.

FP programmer: Execute "OP-8".

FPWIN GR: Execute "STATUS DISPLAY" or "DATA MONITOR".

Note2) You can select whether the CPU will halt or not when an error occurs by setting a system register.

(0: Continue, 1: Stop)

[Remote I/O slave link error] System register No. 27

[I/O error in the remote I/O slave station] System register No. 28



Reference: <Chapter 7 Operation Modes for Controlling MEWNET-F>

9.3 Remote I/O Error Codes (DT9136(DT90136) and DT9137(DT90137))

When an error occurs during remote I/O operation, the contents of the error will be stored in the special data registers DT9136(DT90136) and DT9137(DT90137).

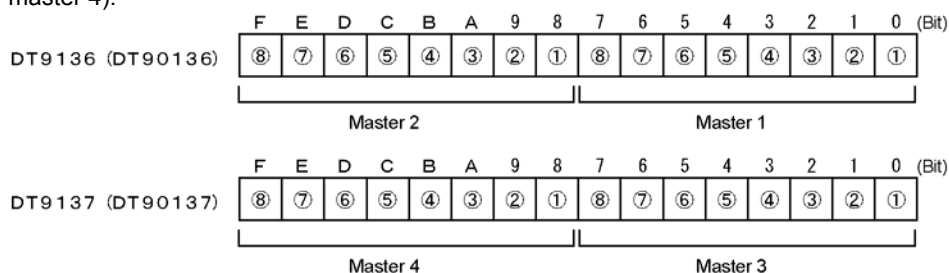
Procedure

FP programmer: Execute "OP-8" or "OP-12".

FPWIN GR: Execute [DATA MONITOR].

9.3.1 Contents of Special Data Registers DT9136 and DT9137

8 bits are used to indicate the status of the communication paths of each master unit (master 1 through master 4).



When an error occurs, bits 1 to 8 corresponding to the contents of the error will be "1" (refer to the following table).

[Example]

When "H8" is stored in DT9137(DT90137), it indicates a terminal station assignment error has occurred on master 3 of the affected communication path.("8H" = "00000000 00001000"; Bit 3 (4) = "1")

	Description	CPU operation	Actions
①	Remote I/O communication error <small>Note1)</small> (Communication error occurs in a slave station.)	Selection <small>Note2)</small>	Check for a power interruption to a slave station or for a disconnected communication cable.
②	Communication error <small>Note1)</small> (Communication error occurs.)	Selection <small>Note2)</small>	Make sure that the communication cable length and slave station number have been set correctly.
③	An illegal unit is installed on a slave station	Halt	Remove the illegal unit.
④	Remote I/O terminal station error	Run	The setting of the terminal station for remote I/O is incorrect. Correctly set the terminal station again.
⑤	Excessive total number of slots on a master unit	Halt	Observe the usage limits. (Max. 64 slots)
⑥	Excessive total number of I/O points on a master unit	Halt	Observe the usage limits.
⑦	Power failure error in a slave unit <small>Note1)</small>	Run	Check the power supply system.
⑧	I/O attribute error on a slave station where a slave unit is installed <small>Note1)</small>	Selection <small>Note2)</small>	Verification error or error in an advanced unit, etc Perform a check of the I/O unit.

Note1) You can determine on which slave station has produced the error.

Note2) You can select whether the CPU will halt or not when an error occurs by setting a system register.



Reference: <Chapter 7 Operation Modes for Controlling MEWNET-F>

9.4 Check a Slave Station Which Has Produced an Error (DT9131(DT90131) to DT9135(DT90135))

During remote I/O operation, and when any of the following errors occurs, you can determine on which slave station has produced the error (its station number and communication path) by monitoring the system data registers. Errors you can check: - Communication error - Momentary breakdown on a slave station - Error in a slave station unit where slave unit is installed

Items you can check

1. The slave station number where an error is occurring.
2. The slave station numbers where errors have occurred.
3. The slave station number where a unit has produced an error.



Note:

The item No. 3 cannot be checked with the I/O terminal board, I/O terminal unit or I/O link unit.

Procedure

1. Checking a communication path where an error is occurring

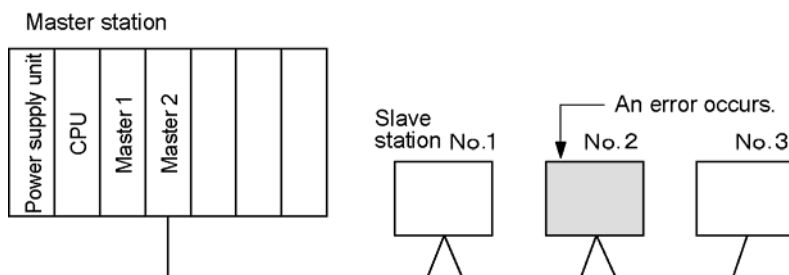
When an error occurs on the communication path of a remote I/O system, the corresponding **special internal relay (R9058 through R905B)** will be turned ON as shown below.

Relay number	Description
R9058	When an error occurs in master 1: ON
R9059	When an error occurs in master 2: ON
R905A	When an error occurs in master 3: ON
R905B	When an error occurs in master 4: ON

By monitoring special data registers DT9136(DT90136) and DT9137(DT90137), you can check the type or source of an error and the bad master unit.

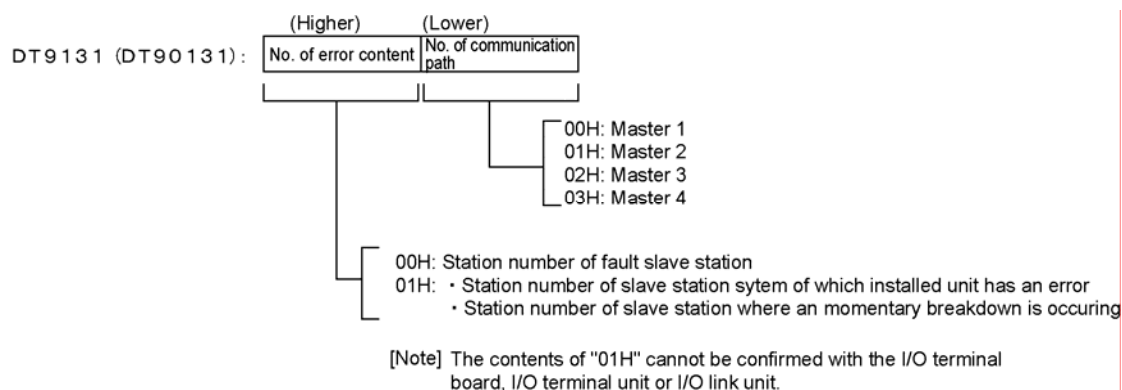
[Example]

In the following system and condition, R9059 will be turned ON. (Error on the remote I/O system of master 2)



2. Select the item whose contents you want to check

Select the item you want to check and set the corresponding code in the special data register DT9131(DT90131). Specify the code as a hexadecimal number.



[Example]

Assuming the unit producing an error is a slave station where a slave unit is installed on the remote I/O system of master 2.

DT9131(DT90131) = 0101H

3-1. Check the slave station in which an error occurs

When you want to check which slave station is producing the error, set the higher 8 bits of DT9131(DT90131) to "00H".

At this time, the special data registers DT9132(DT90132) to DT9135(DT90135) will be as follows.

	F	E	D	C	B	A	9	8	7	6	5	4	3	2	1	0 (Bit)	
DT9132 (DT90132)	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	Current value
DT9133 (DT90133)	32	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	
DT9134 (DT90134)	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	Accumulated value
DT9135 (DT90135)	32	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	

The bits corresponding to the slave station number where the error is being produced will be "1".

[Example]

When DT9131(DT90131) is "0101H" and DT9133(DT90133) is "4000H", it indicates that the slave station number 31 of master 2 has an error. ("4000H" = "01000000 00000000"; Bit 14 (No. 31) = "1")

3-2. Checking a unit where slave unit is installed which has produced an error

When you check on which unit where slave unit is installed, a unit has an error such as verification error or system error, set the higher 8 bits of DT9131(DT90131) to "01H".

At this time, the special data registers DT9132(DT90132) to DT9133(DT90133) will be as follows.

	F	E	D	C	B	A	9	8	7	6	5	4	3	2	1	0 (Bit)
DT9132 (DT90132)	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
																Slave station No.
DT9133 (DT90133)	32	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17

The bits corresponding to the slave station number where the error is being produced will be "1".

[Example]

When DT9131(DT90131) is "0101H" and DT9133(DT90133) is "2H", it indicates that the slave station number 18 of master 2 has an error. ("2H" = "00000000 00000010"; Bit 1 (No. 18) = "1")



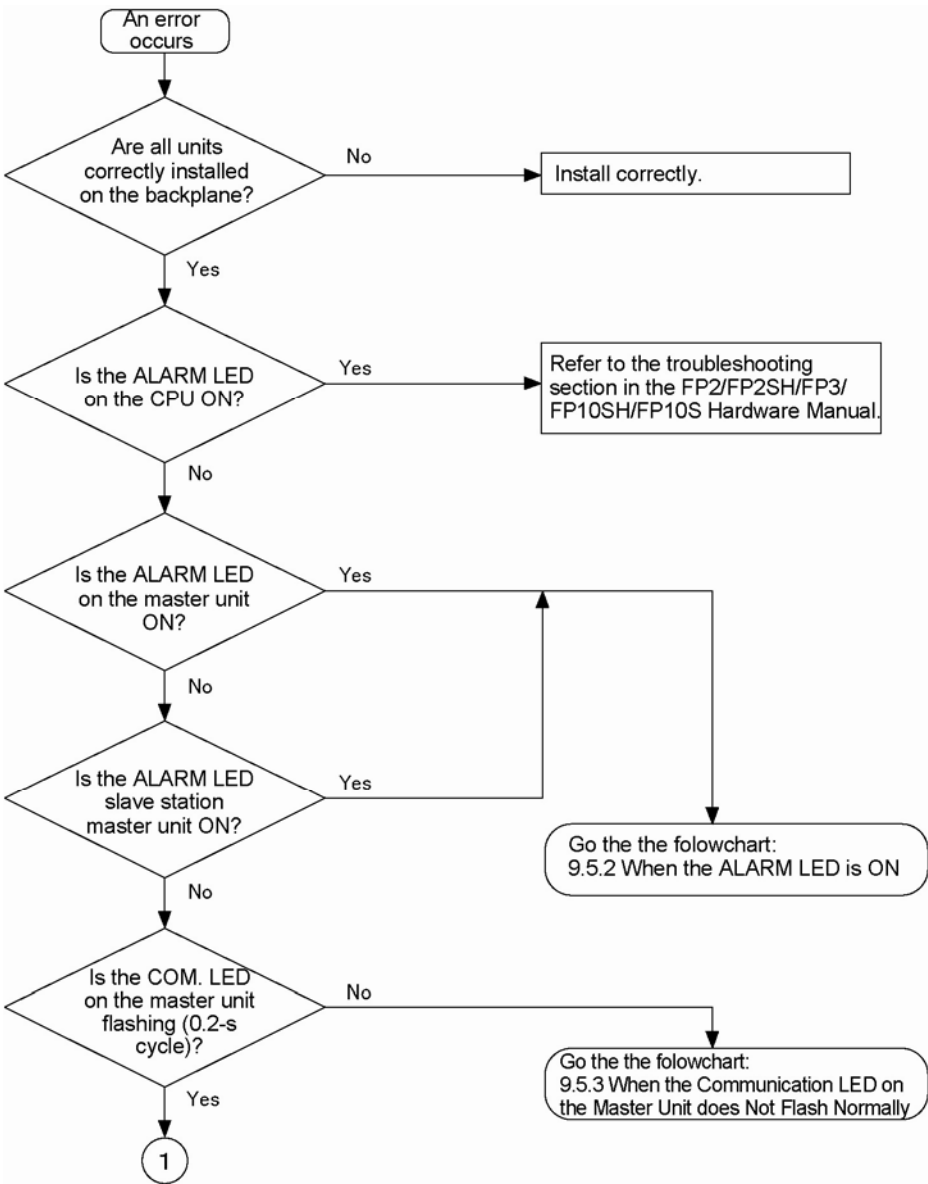
Note:

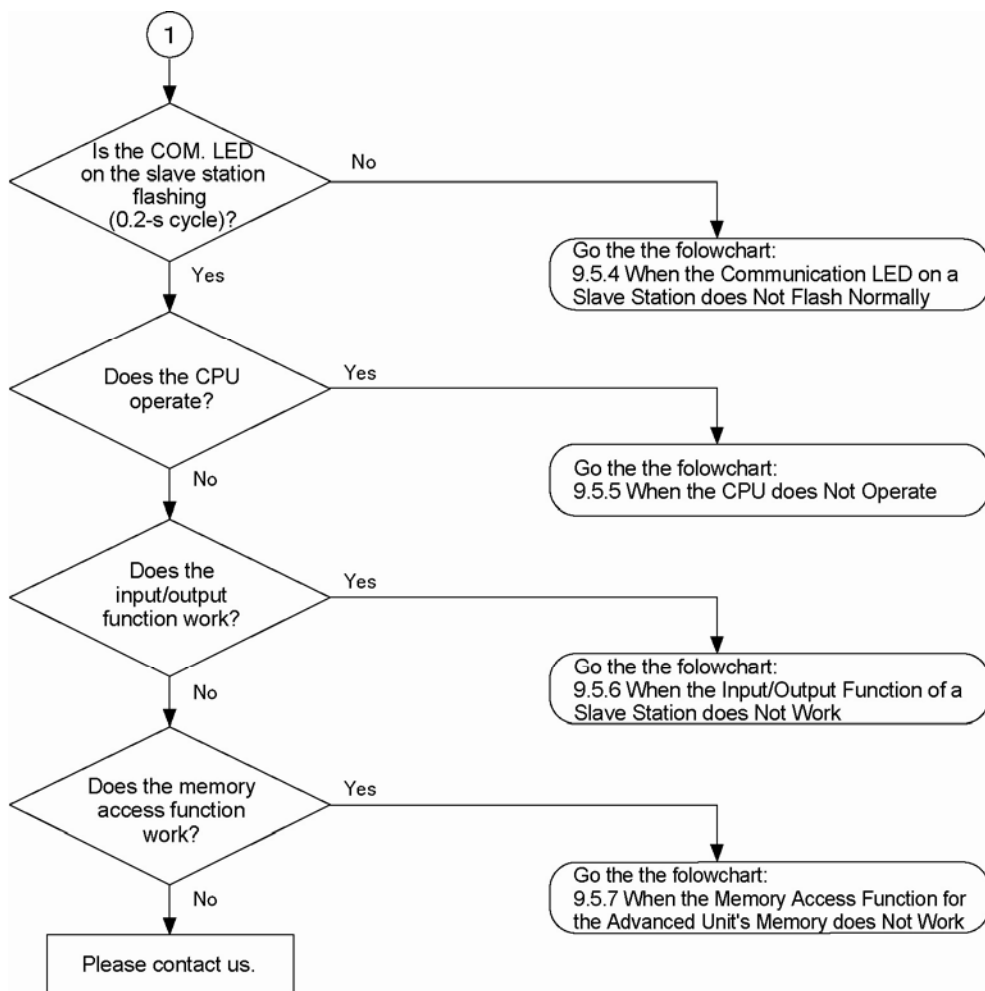
The item No. 3-2 cannot be checked with the I/O terminal board, I/O terminal unit or I/O link unit.

9.5 Troubleshooting

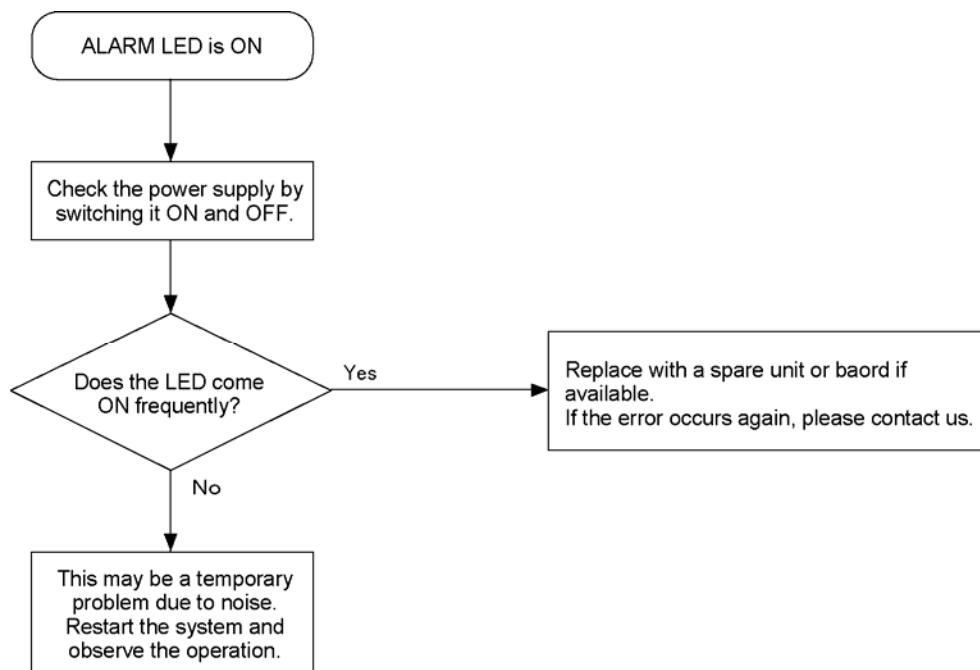
This section provides the methods of troubleshooting for the operation of the remote I/O system [MEWNET-F].

9.5.1 Flowchart (Main Flowchart)

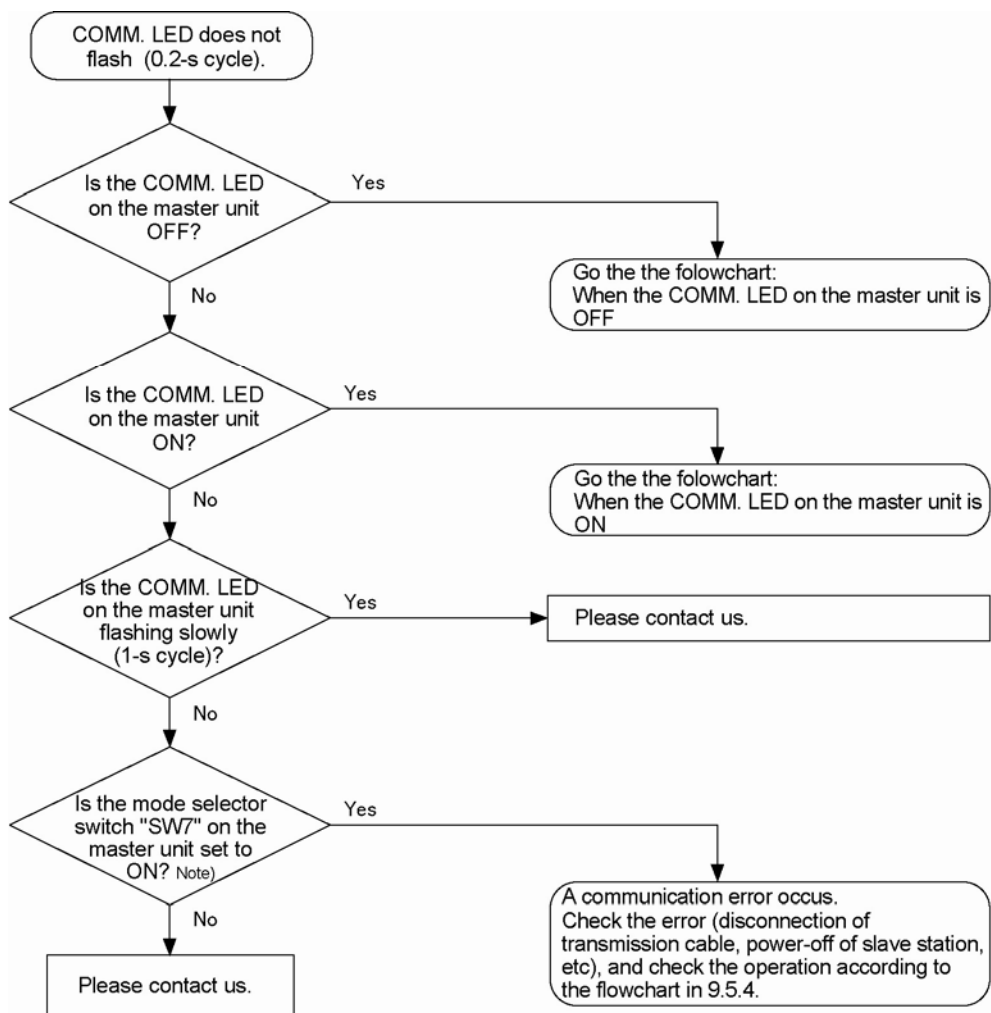




9.5.2 When the ALARM LED is ON

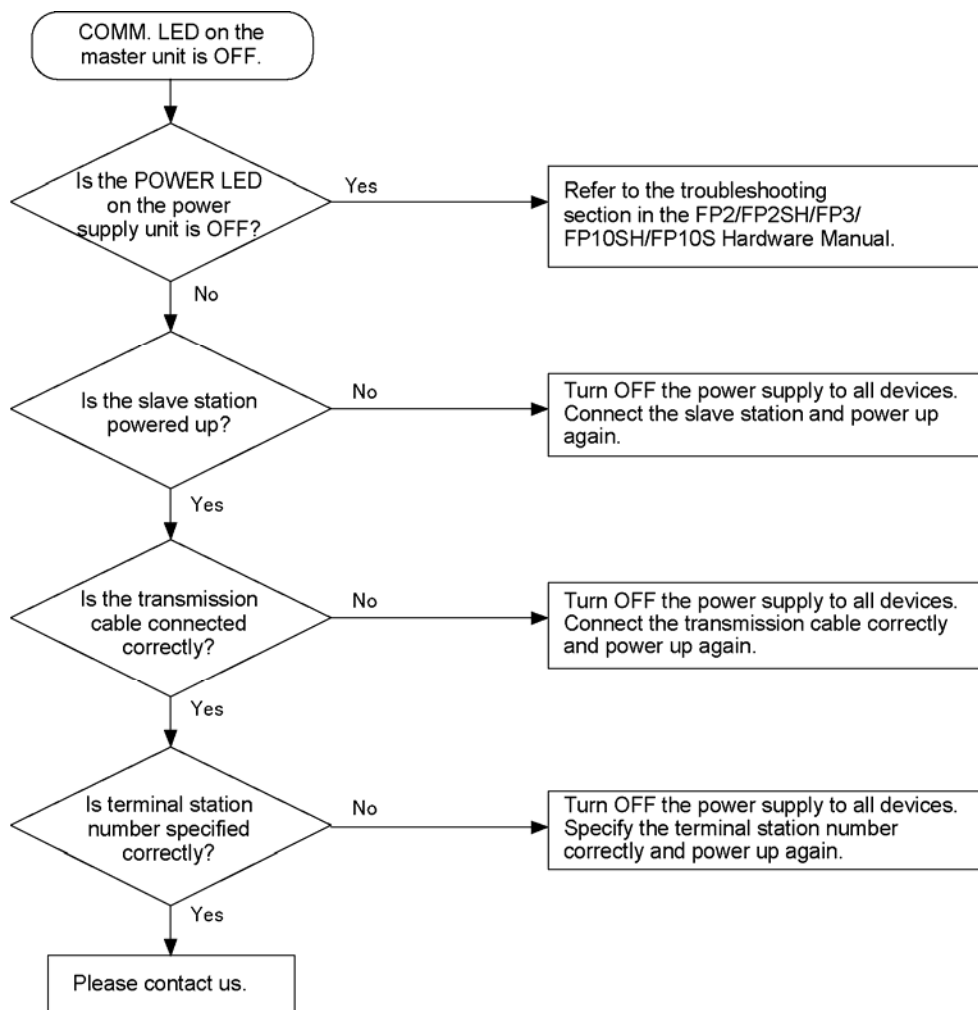


9.5.3 When the Communication LED on the Master Unit does Not Flash Normally

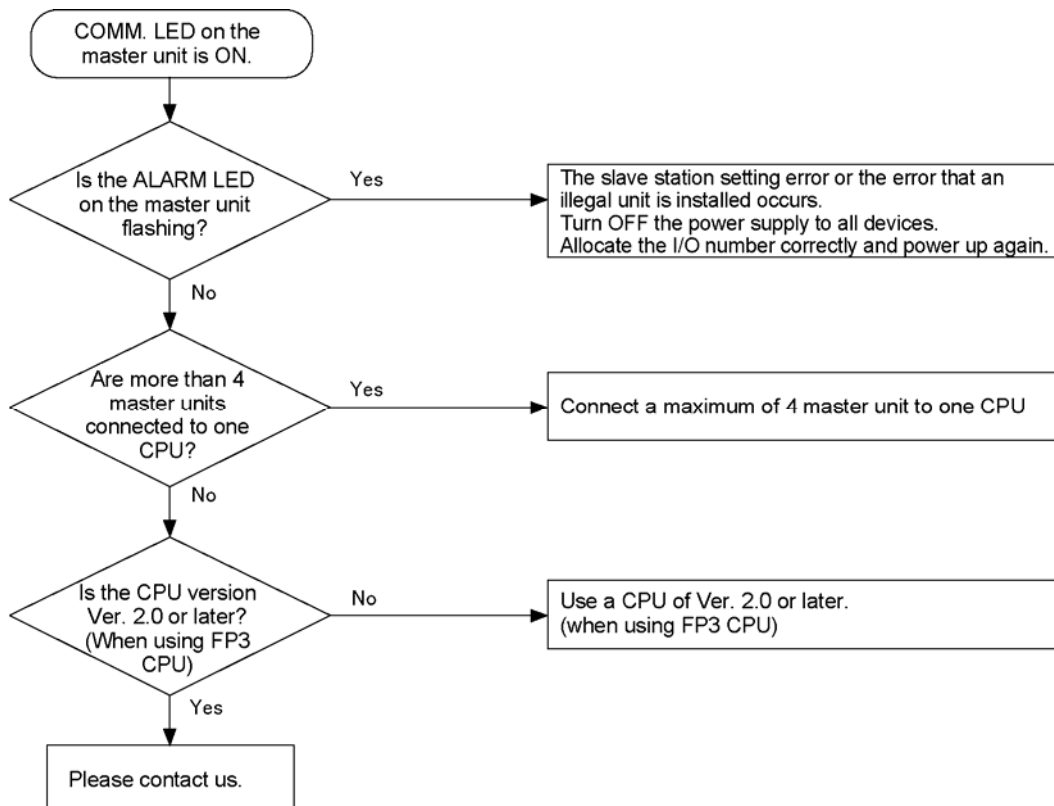


Note) When using the FP2 Multi-wire link unit, it is the switch "SW1".

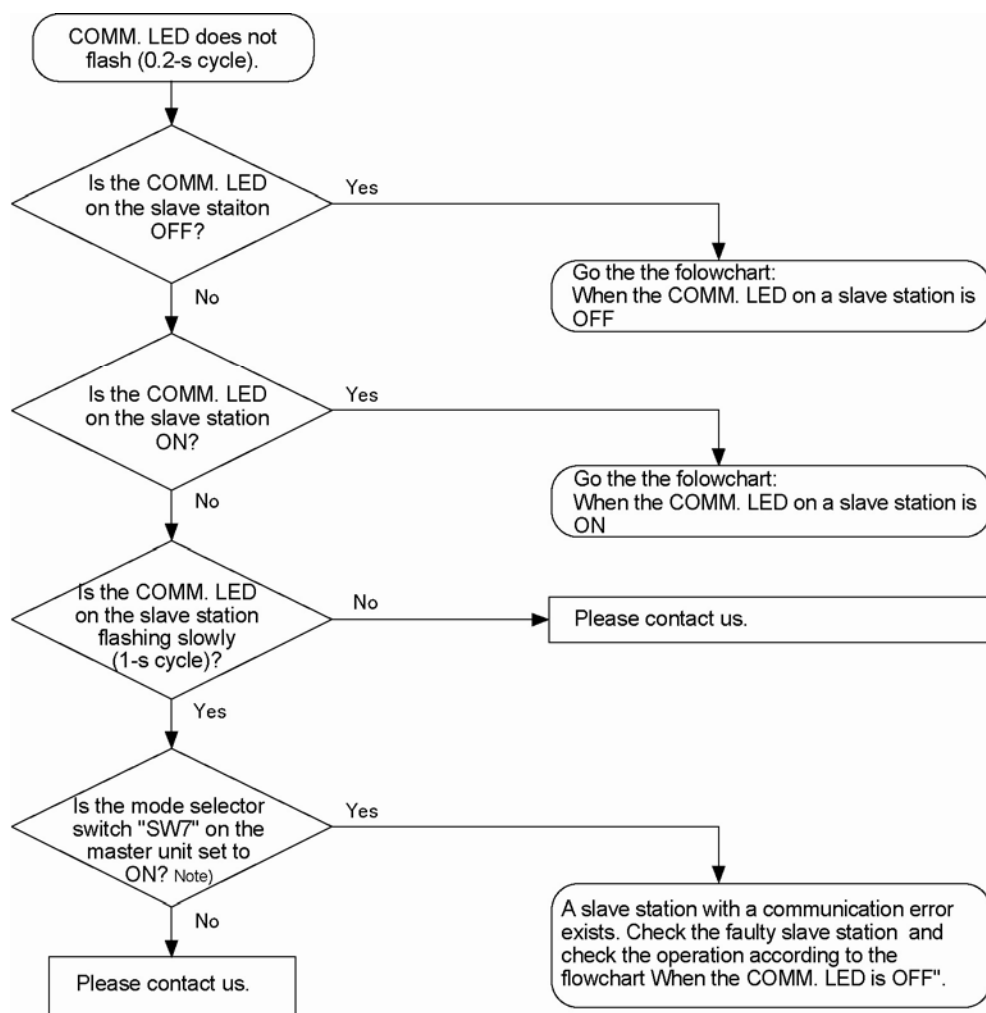
When the COMM. LED is OFF



When the COMM. LED is ON

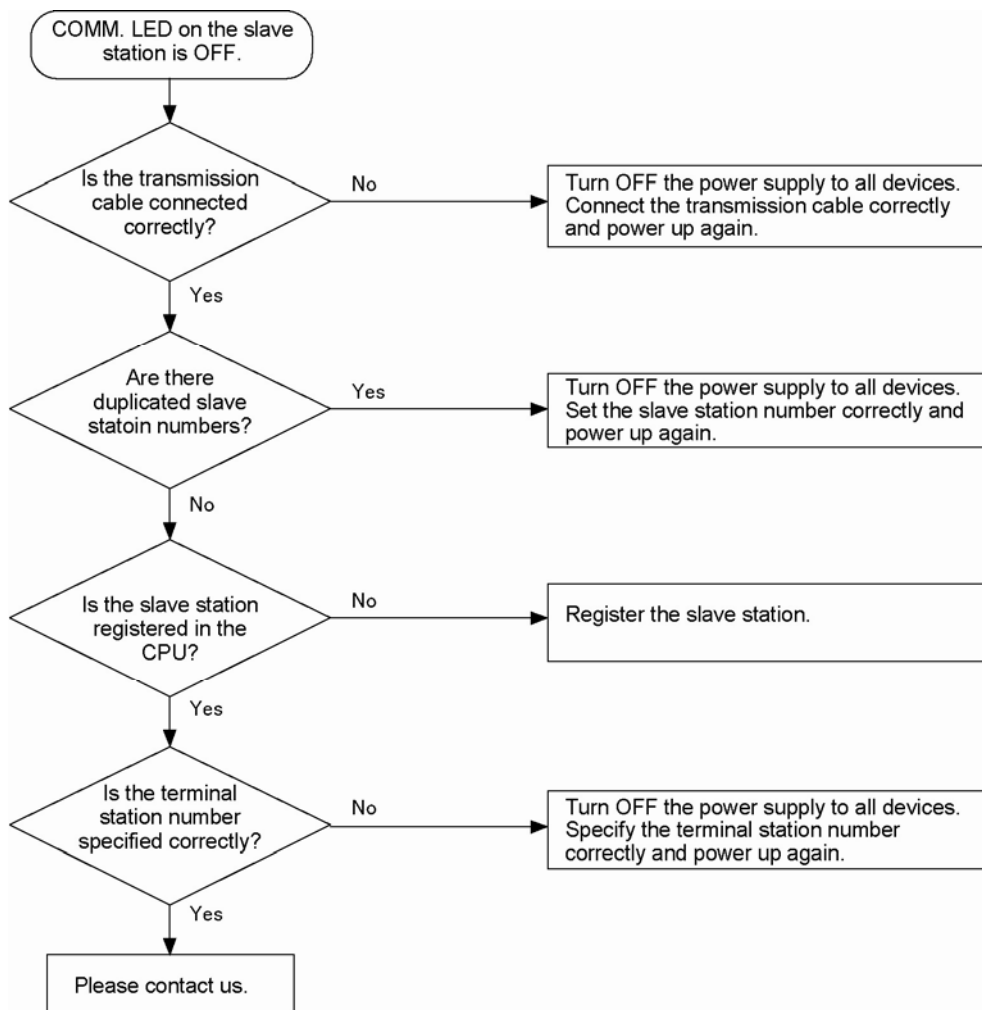


9.5.4 When the Communication LED on a Slave Station does Not Flash Normally

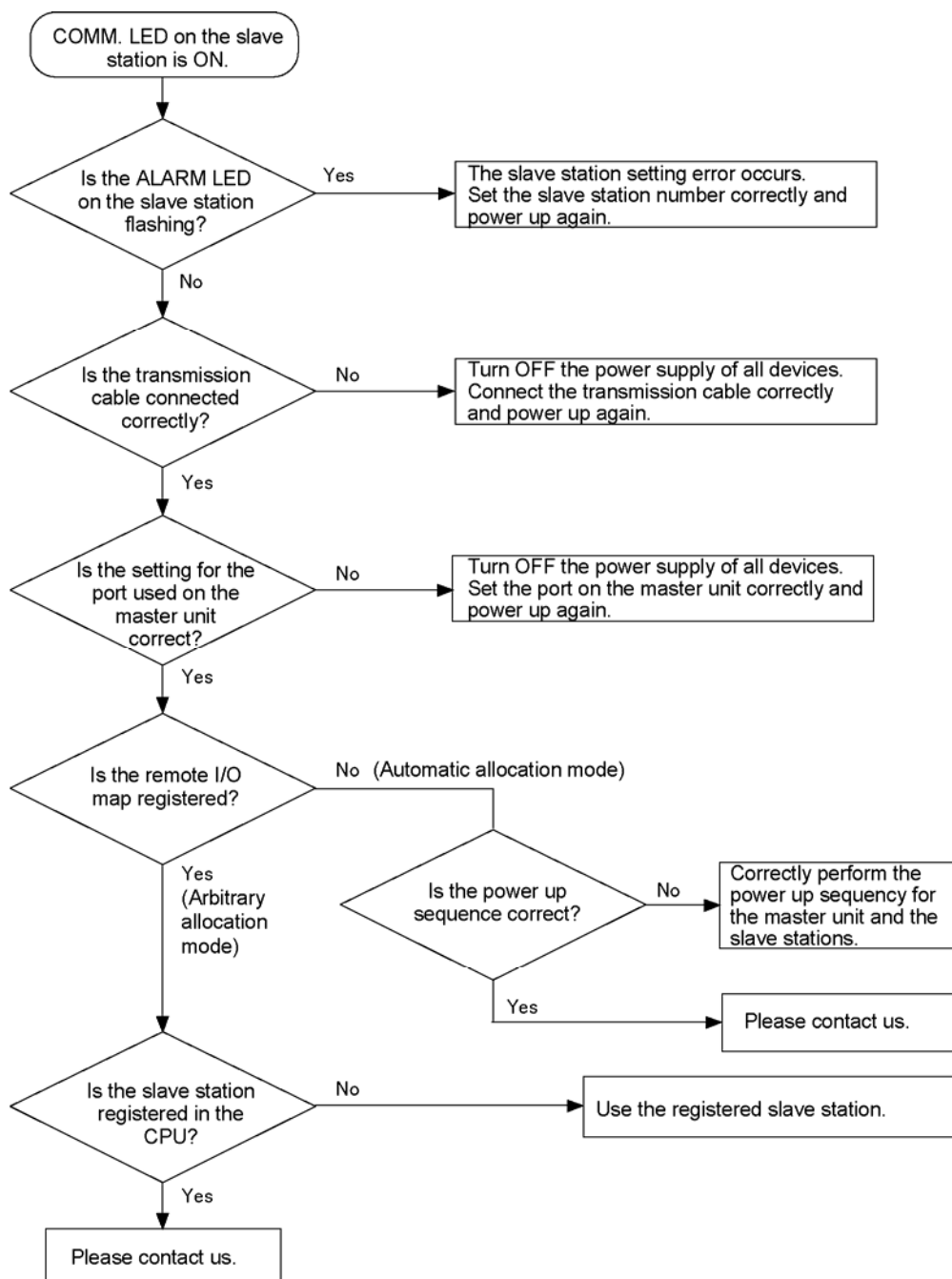


Note) When using the FP2 Multi-wire link unit, it is the switch "SW1".

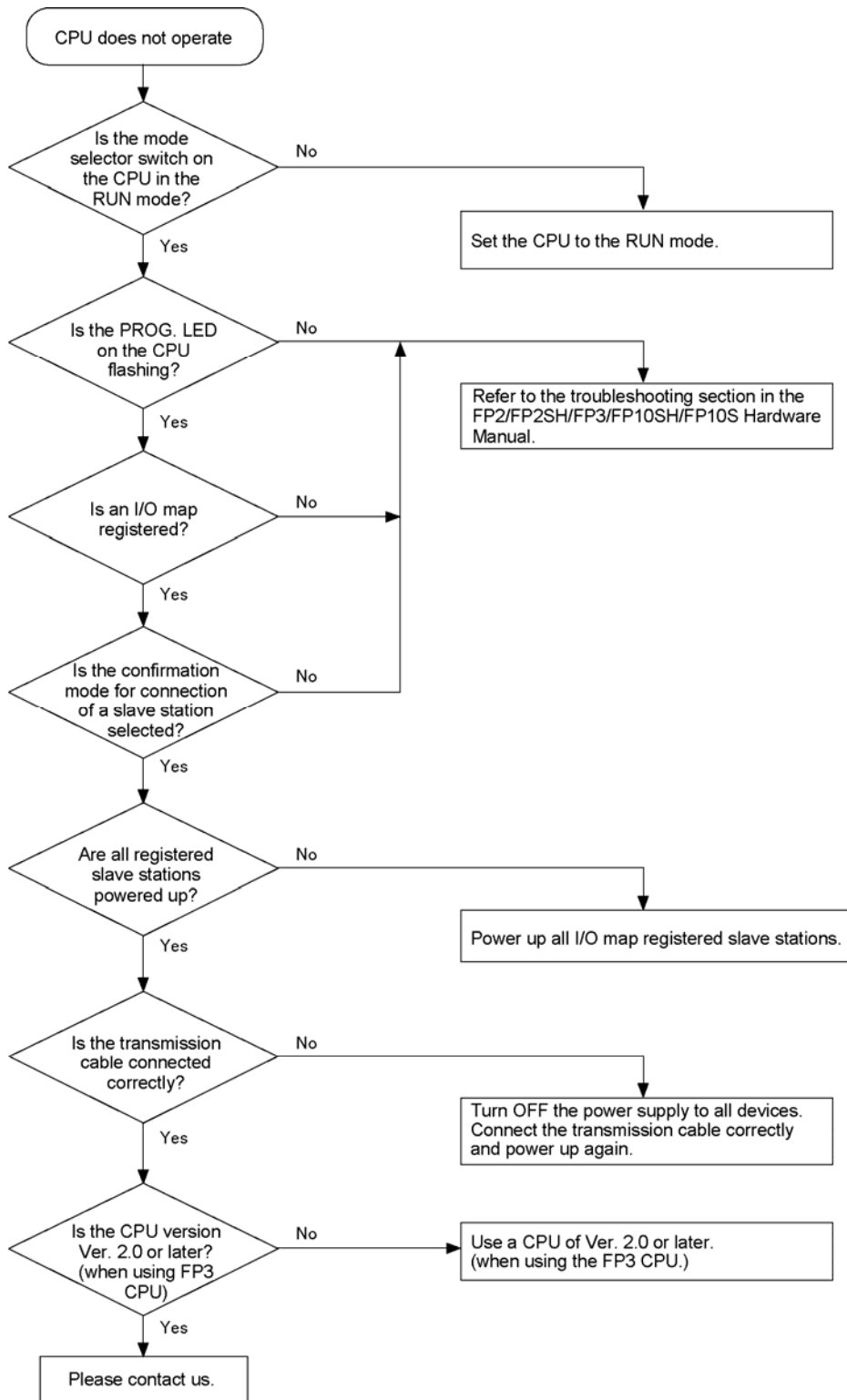
When the COMM. LED is OFF



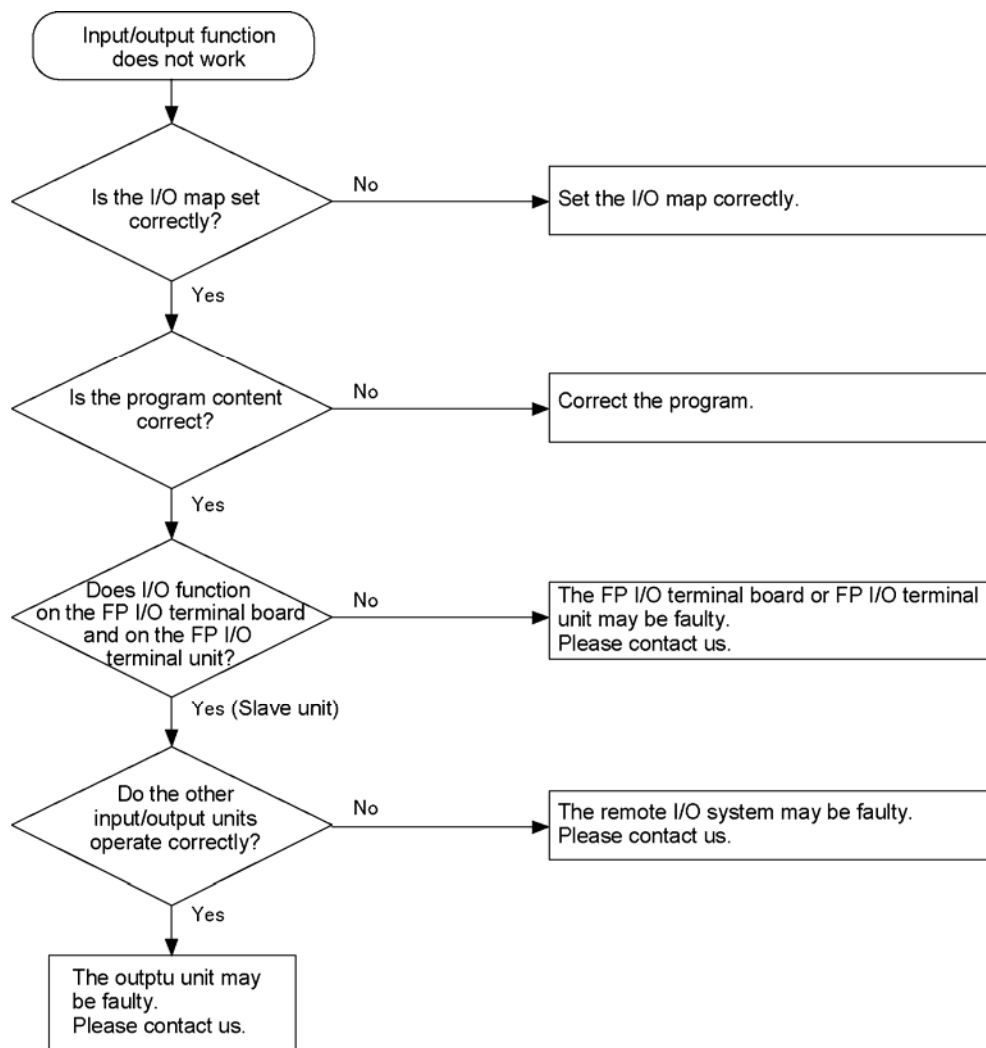
When the COMM. LED is ON



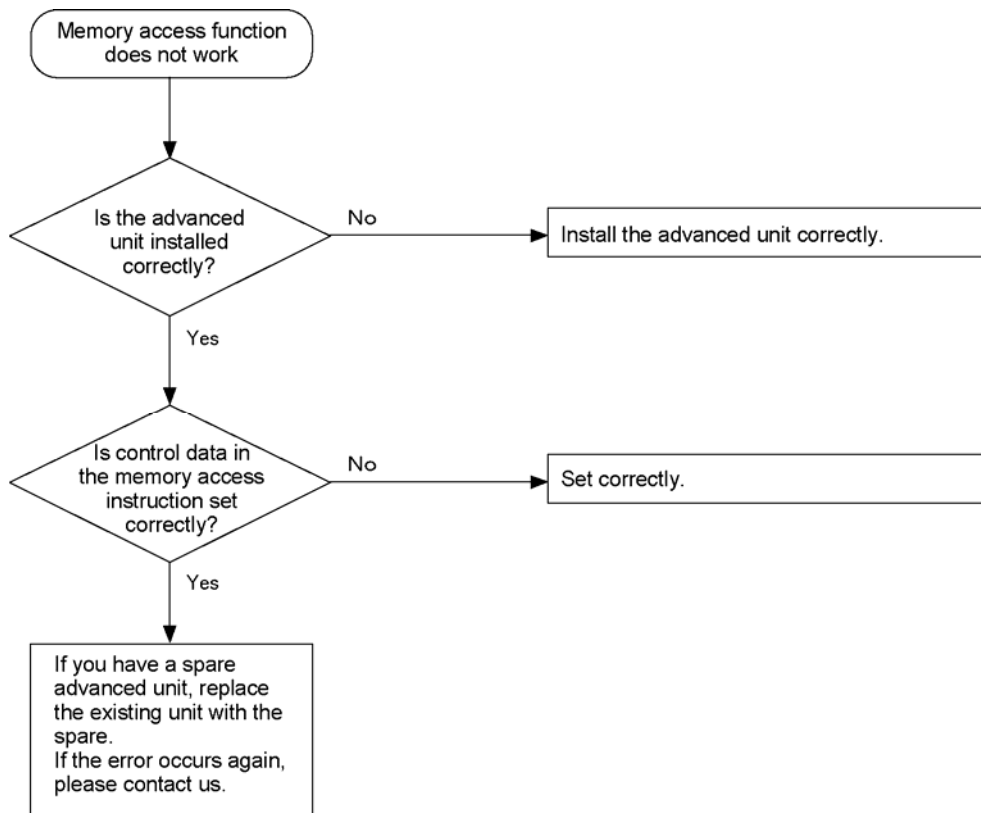
9.5.5 When the CPU does Not Operate



9.5.6 When the Input/Output Function of a Slave Station does Not Work



9.5.7 When the Memory Access Function for the Advanced Unit's Memory does Not Work






















9.6 LED Status

Check the CPU, master unit, slave unit, I/O terminal board, I/O terminal unit and FP I/O link unit for the ON/OFF status of their LEDs, then find the cause of the error by referring to the table below.














LED status when the system is turned on


*The CPU of the master station must be started after it is set to the "PROG. mode".

CPU	Master	Slave station	Contents	Actions
 PROG. LED (ON)	 COMM./COM. LED (Flashing)	 COMM./COM. LED (Flashing)	Normal	
 PROG. LED (Flashing)	 COMM./COM. LED (Flashing)	 COMM./COM. LED (Flashing)	There is a slave station which is not activated although its I/O numbers are registered in the CPU. ("Slave station connection wait mode" is activated. Even if the CPU goes to the RUN mode, the operation will not start.)	Turn on the power of the slave stations which is not activated. Check the communication cable to see if it is correctly connected. Make sure all of the slave stations registered in the CPU are connected. Match all of the settings, then restart again.
 ERROR LED (ON)	 ALARM LED (ON)		Temporary error caused by noise. (Self-diagnostic code E41)	Restart the system.
			Error on the master unit. (Self-diagnostic code E41)	Please contact us.
	 ALARM LED (OFF)	 ALARM LED (ON)	Temporary error caused by noise.	Restart the system.
			Error on the slave station.	Please contact us.
	 COMM. LED (ON)		More than 4 master units are installed.	Remove extra master units, then restart the system.
			CPU version is not ver. 2.0 or later. (When using FP3 CPU)	Use a CPU whose version is Ver. 2.0 or later. (When using FP3 CPU)
		 COMM./COM. LED (Flashing)  ALARM LED (Flashing)	Units which cannot be used for the MEWNET-F are installed on a slave station system. (Self-diagnostic code E35)	Reconfigure the slave station. Remove any unit which cannot be installed on the station.
		 COMM./COM. LED (Flashing)	Terminal stations are not assigned correctly. (Self-diagnostic code E51)	Both ends of communication path should be terminal stations.

CPU	Master	Slave station	Contents	Actions
 ERROR LED (ON)		 COMM./COM. LED (OFF)	The communication cable is not connected correctly.	Check the communication cable for correct connection.
			The slave station number is duplicated.	Reset the duplicated station numbers, and assign I/O. Then, restart the system.
			Terminal stations are not assigned correctly. (Self-diagnostic code E51)	Both ends of communication path should be terminal stations.
		 COMM./COM. LED (ON)	The communication cable is not connected correctly.	Check the communication cable for correct connection. Check the ports of the master unit.
			The slave station is not registered.	Register the slave station, and then restart the system.
		 COMM./COM. LED (ON)  ALARM LED (Flashing)	The slave station number is out of range (1 through 32).	Assign a slave station number within the applicable range.

LED status during the operation

CPU	Master	Slave station	Contents	Actions
 RUN (ON)	 COMM./COM. LED (Flashing)	 COMM./COM. LED (Flashing)	Normal	
 ERROR LED (ON)	 COMM./COM. LED (Flashing)	 COMM./COM. LED (Flashing)	Error in a unit installed on a slave station system.	Exchange the bad unit with a good one. The procedures to restart the system vary depending on the operation mode. Note1)
			Terminal stations are not assigned correctly. (Self-diagnostic code E51)	Both ends of communication path should be terminal stations.
 ERROR LED (ON)	 COMM./COM. LED (Flashing)	 COMM./COM. LED (OFF)	This slave station cannot communicate with the master station. (communication error)	Check the communication cable for correct connections. The procedures to restart the system vary depending on the operation mode. Note1)
	 COMM./COM. LED (Flashing slowly)	 COMM./COM. LED (Flashing slowly)	Other slave stations have a communication error. (A slave station whose COMM./COM. LED is flashing is normal.)	Check the communication cable for correct connections, then restart the system. Note1)
	 COMM./COM. LED (Flashing slowly)	 COMM./COM. LED (OFF)	Other slave stations have a communication error. (A slave station whose COMM./COM. LED is flashing is normal.)	Check the communication cable for correct connections, then restart the system. Note1)

Note1)  **Reference:** <7.2 Remote I/O Control When an Error Occurs>

9.7 Precautions When Using Remote I/O System

Be sure to take the following notes for using the remote I/O system [MEWNET-F].

- (1) Install and remove the units that configure the [MEWNET-F] with all power OFF.
- (2) Be sure to install the units that configure the [MEWNET-F] securely on the backplane.
- (3) Pay attention not to allow pieces of wire or other objects to fall into the unit when making wiring connections.
- (4) Do not touch the connectors on the rear side. It may cause damage to the master unit or slave unit because of static electricity.
- (5) Do not drop the units or boards and do not apply excessive force to any unit.
- (6) The system should only be used within the specified ratings.
- (7) The system should be used in a place where it will not be influenced from power transmission lines, high voltage equipment, power cables, power equipment, hum and surge generating equipment.
- (8) When installing the power supply line and communication line, wire them in separate ducts, or maintain a clearance between those lines.
- (9) If any one of product numbers, AFP3740, AFP87441, AFP87442 and AFP3741 is used in the network, the transmission distance will be shorten as shown in the table below.

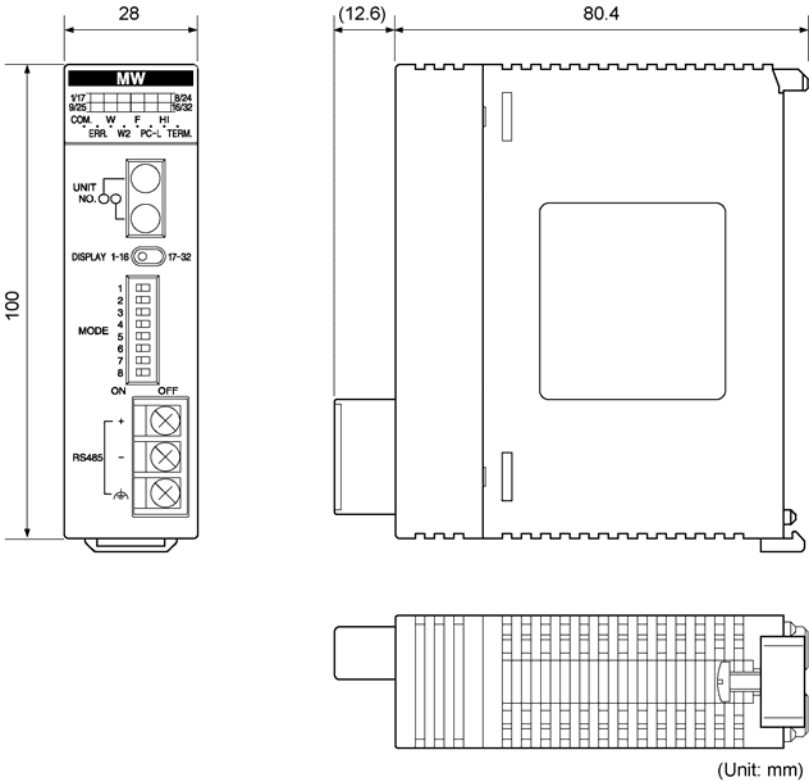
Cable Type	Product No.	Max. transmission distance (Total length)	
		When they are not used	When any one of them is used
Twisted pair	Hitachi Cable, KPEV-S1.25 mm ² x 1P Belden 9860	700 m	300 m
	Hitachi Cable, KPEV-S 0.5 mm ² x 1P Belden 9207	600 m	300 m
VCTF	VCTF 0.75 mm ² x 2C	400 m	200 m

Chapter 10

Dimensions

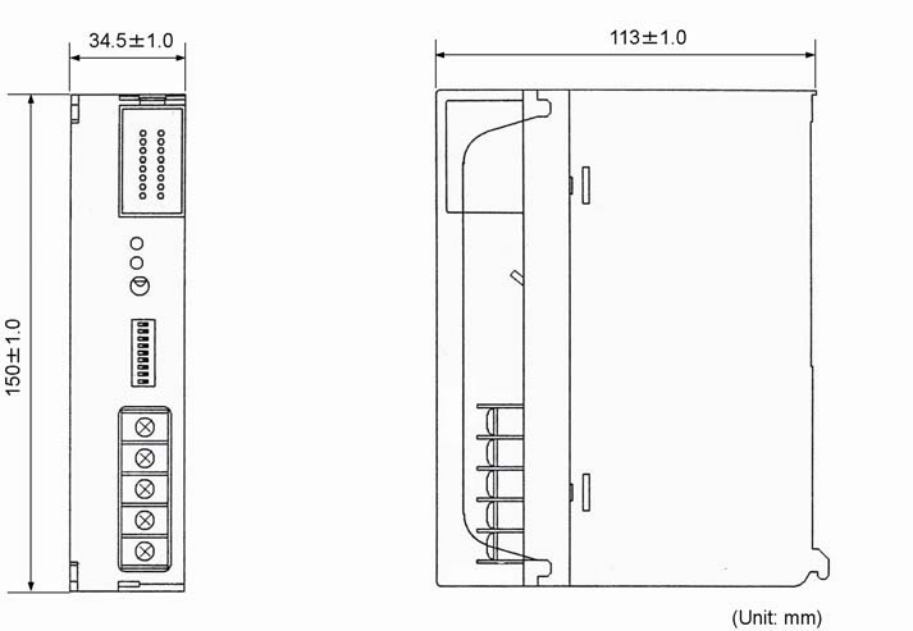
10.1 FP2 Multi-wire Link Unit

AFP2720



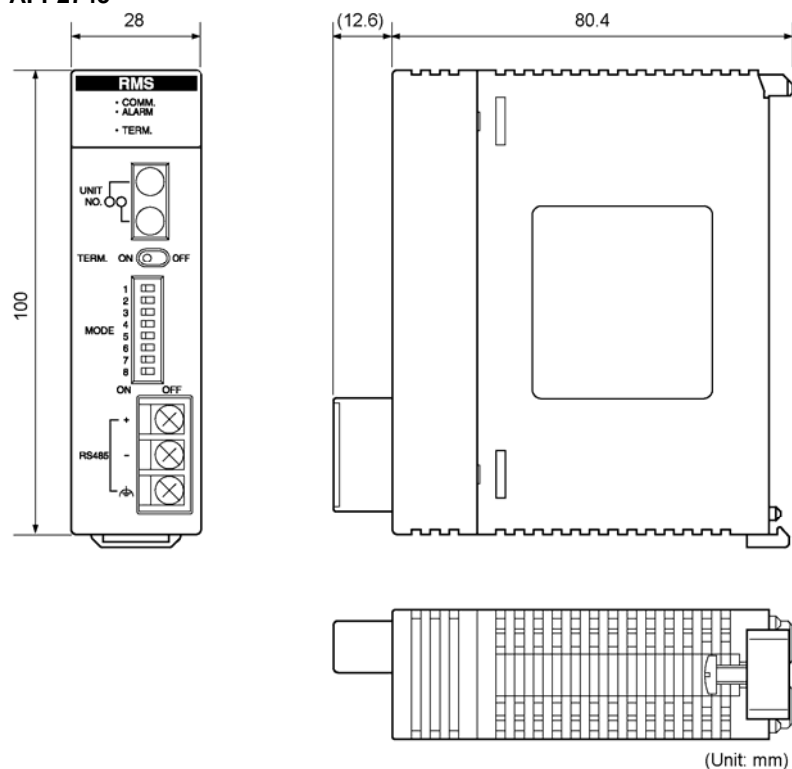
10.2 FP3 Remote I/O Master Unit

AFP3742



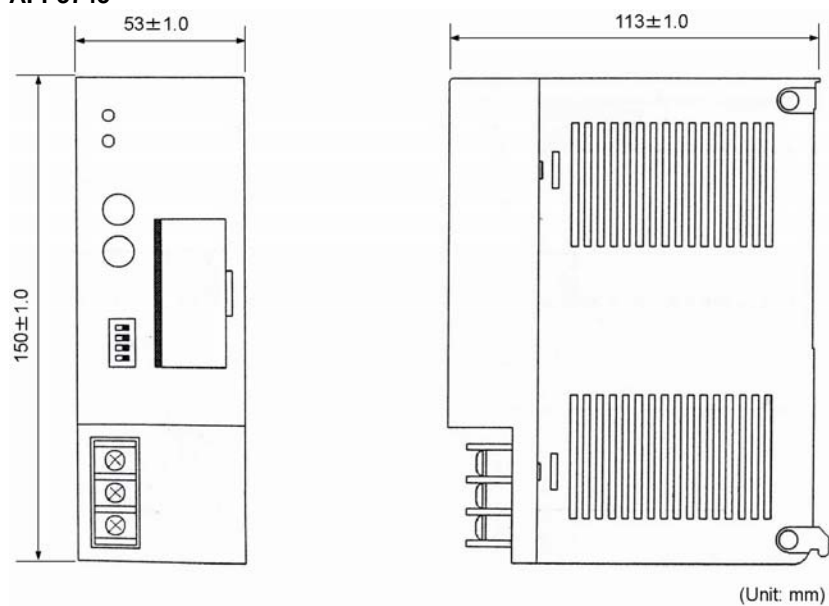
10.3 FP2 Remote I/O Slave Unit

AFP2745



10.4 FP3 Remote I/O Slave Unit

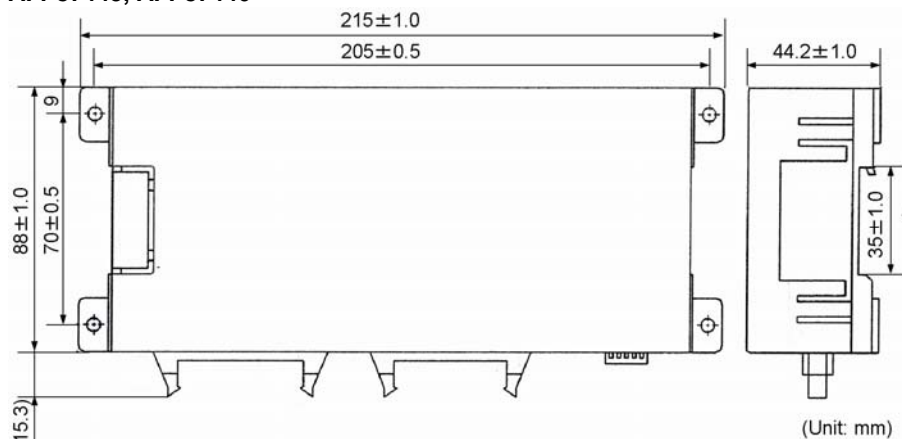
AFP3745



10.5 FP I/O Terminal Board

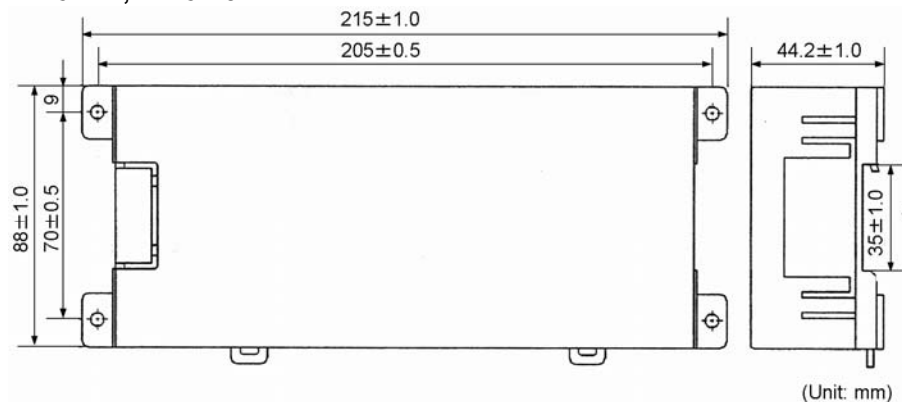
10.5.1 MIL Connector Type

AFP87445, AFP87446



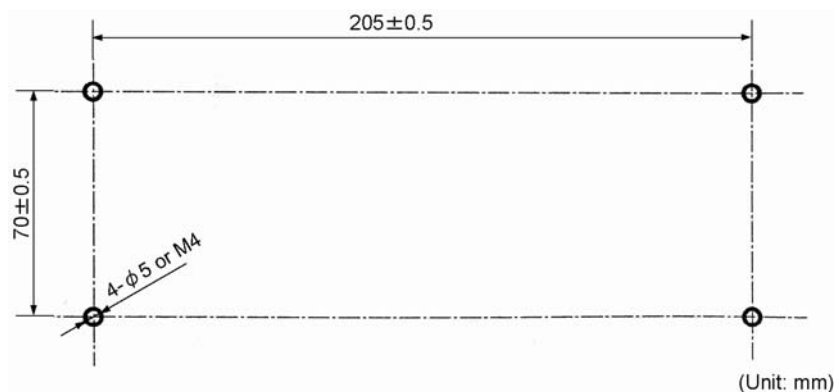
10.5.2 Terminal Block Type

AFP87444, AFP87432



* DIN standard rail installing groove: Adapted to DIN standard rail [DIN EN50022]

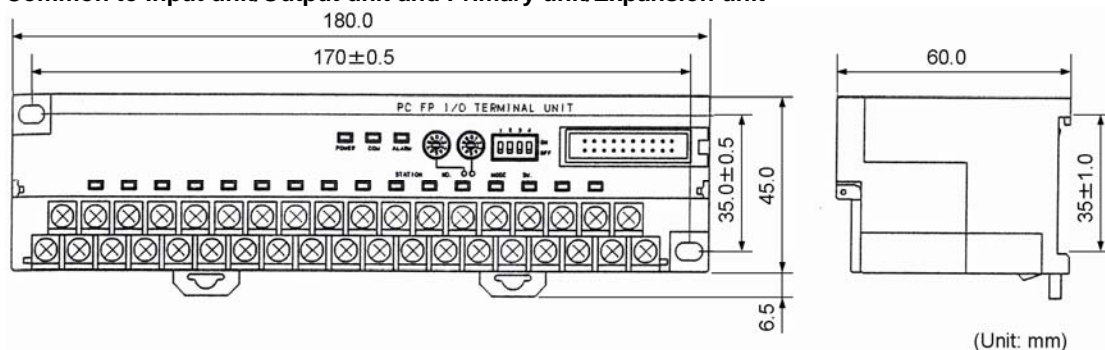
10.5.3 Mounting Hole Dimensions (In Common)



10.6 FP I/O Terminal Unit

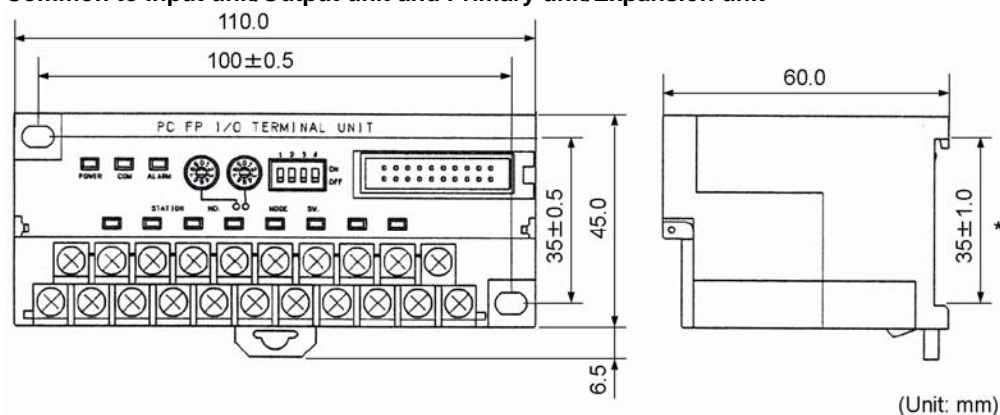
10.6.1 16-point Type

Common to Input unit/Output unit and Primary unit/Expansion unit



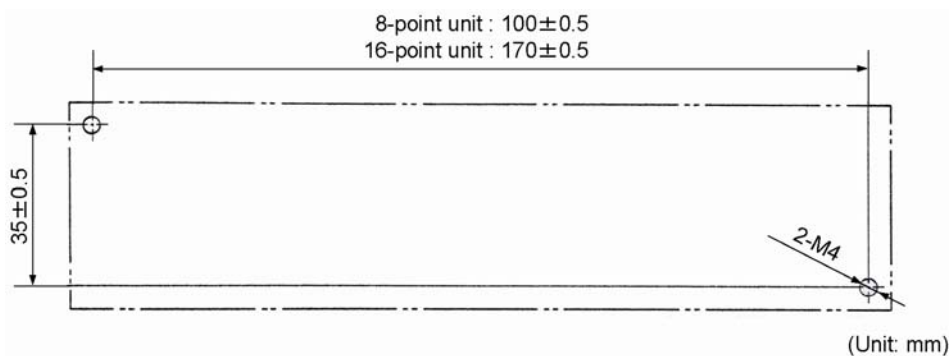
10.6.2 8-point Type

Common to Input unit/Output unit and Primary unit/Expansion unit



* DIN standard rail installing groove: Adapted to DIN standard rail [DIN EN50022]

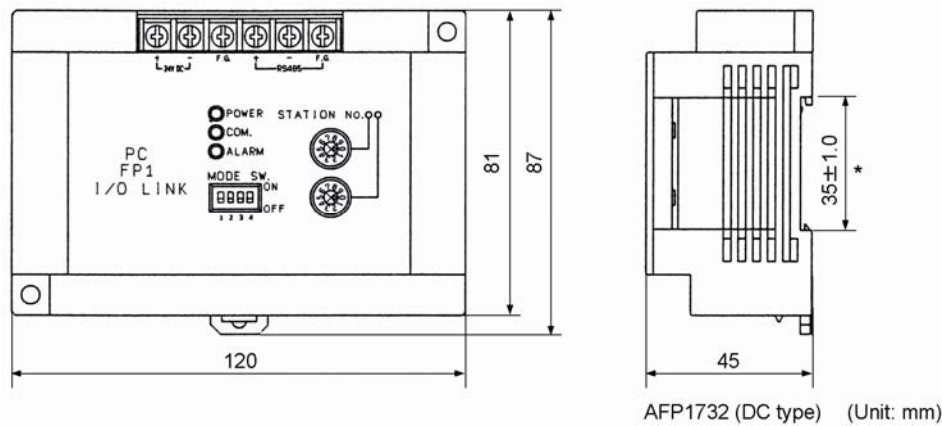
10.6.3 Mounting Hole Dimensions



10.7 FP1 I/O Link Unit

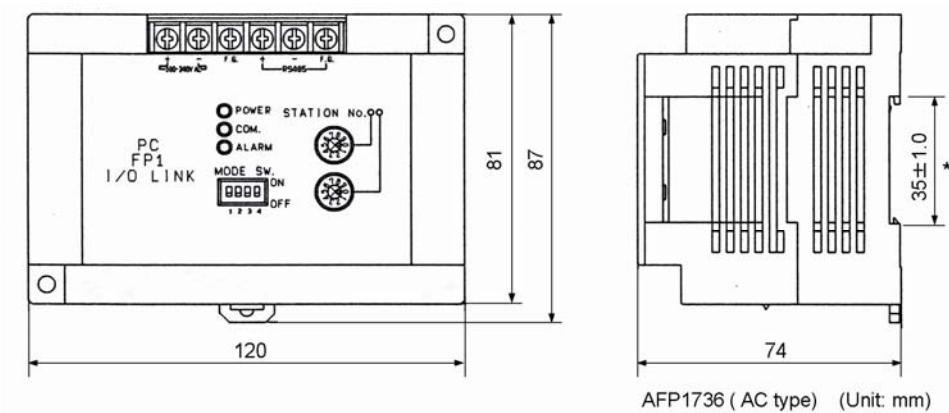
10.7.1 DC Power Supply Type

AFP1732



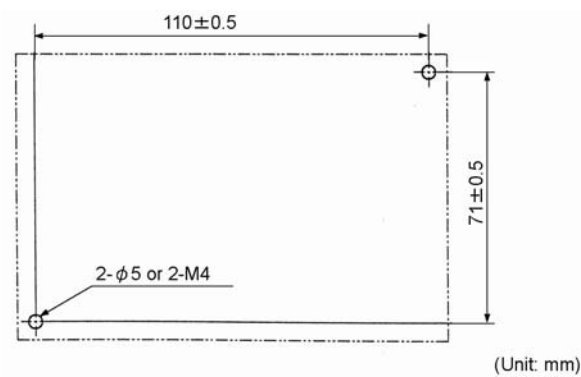
10.7.2 AC Power Supply Type

AFP1736



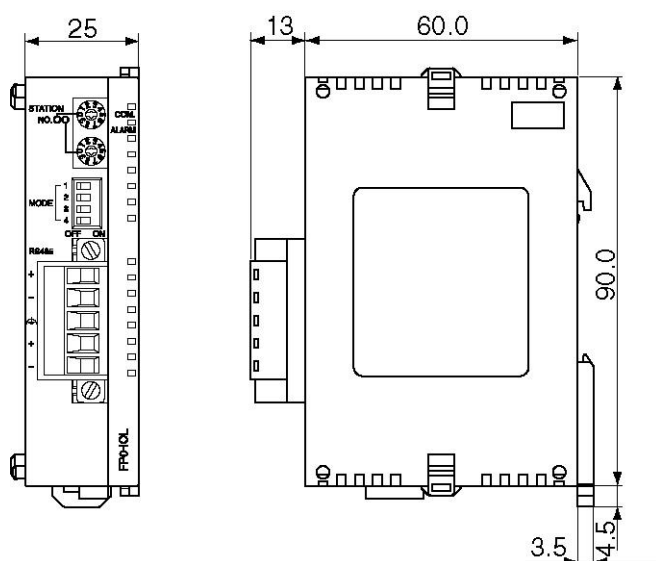
* DIN standard rail installing groove: Adapted to DIN standard rail [DIN EN50022]

Mounting Hole Dimensions (Common)



10.8 FP0 I/O Link Unit

AFP0732



Chapter 11

(Appendix 1) I/O Link With FP1

11.1 I/O Link With FP-M

This chapter explains the I/O link with FP1, however, it is also possible to achieve the I/O link with FP-M using FP-M I/O link board (AFC1731 or AFC1732).

For information on the specifications and part names of FP-M I/O link board, refer to "FP-M Hardware Manual" (No. FAF-175).As the followings are the commont items between FP1 and FP-M, refer to each page.

Overview of I/O link	11.2 Overview of I/O Link Unit
Wiring of communication cables	12.5.2 Wiring to FP2/FP2SH/FP3/FP10SH
Operaiton mode	11.5.5 Selecting Operation Mode
I/O allocation	11.6 I/O Allocation
	(However, FP-M uses X110 to X12F/Y110 to Y12F.)
How to use	11.7 Usage Example

11.2 Overview of FP1 I/O Link Unit

The FP1 I/O Link Unit is the interface unit for exchanging I/O information between programmable controllers "FP2/FP2SH/FP3/FP10SH" and "FP1".

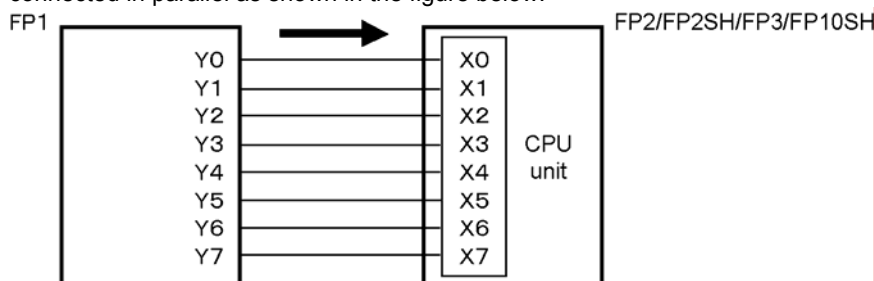
When the FP1 is connected to the FP2/FP2SH/FP3/FP10SH Remote I/O system [MEWNET-F] via the I/O link unit, you can exchange I/O information in the serial communication format, using a 2-conductor cable.

11.2.1 Idea of I/O Link

By connecting the output relays of one programmable controller to the input relays of the other programmable controller, the output information on one controller can be treated as the input information on the other controller. Exchanging I/O information like this is called "I/O link".

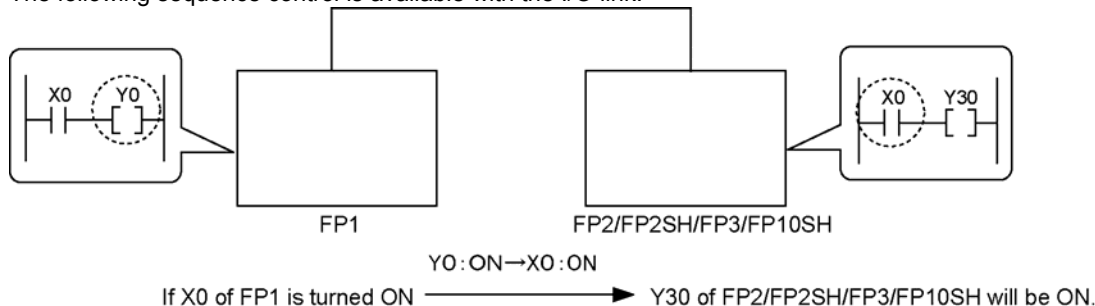
[Example]

The output relays Y0 to Y7 of "FP1" and the input relays X0 to X7 of "FP2/FP2SH/FP3/FP10SH" are connected in parallel as shown in the figure below.



Relays Y0 to Y7 correspond to relays X0 to X7 respectively. If the output relay Y3 of "FP1" is turned ON, the input relay X3 of "FP2/FP2SH/FP3/FP10SH" will be ON.

The following sequence control is available with the I/O link.



The FP1 I/O link unit is the interface unit for exchanging I/O information between programmable controllers "FP2/FP2SH/FP3/FP10SH" and "FP1" connected with a 2-conductor cable using the [MEWNET-F].

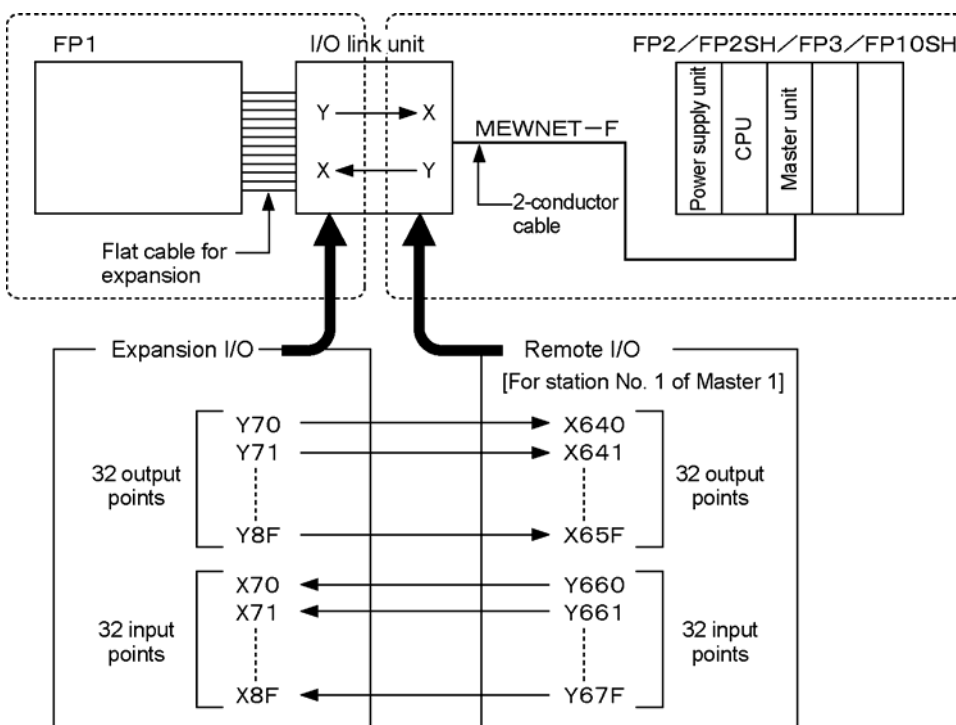
11.2.2 Remote I/O and Expansion I/O

The I/O link unit enables the I/O link between FP1 and FP2/FP2SH/FP3/FP10SH connected with a 2-conductor cable via the remote I/O system.

1. On FP2/FP2SH/FP3/FP10SH, the I/O link unit is treated as one slave station, and the I/O is controlled as the remote I/O. The I/O that has been allocated in the remote I/O map is used. 32-point input and 32-point output can be used.
2. On FP1, the I/O link unit is controlled as the expansion I/O. However, the usable I/O is the special I/O (fixed) for the I/O link.

<Special I/O for FP1 I/O link>

I/O type	I/O No.	Description
Input relay	X70 to X8F (32 points)	When the corresponding output Y in the FP2/FP2SH/FP3/FP10SH is turned ON, X70 to X8F will go ON.
Output relay	Y70 to Y8F (32 points)	When the Y70 to Y8F is turned ON, the corresponding input X in the FP2/FP2SH/FP3/FP10SH will go ON.



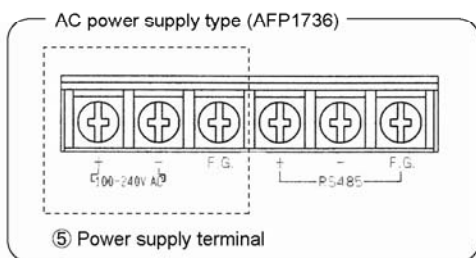
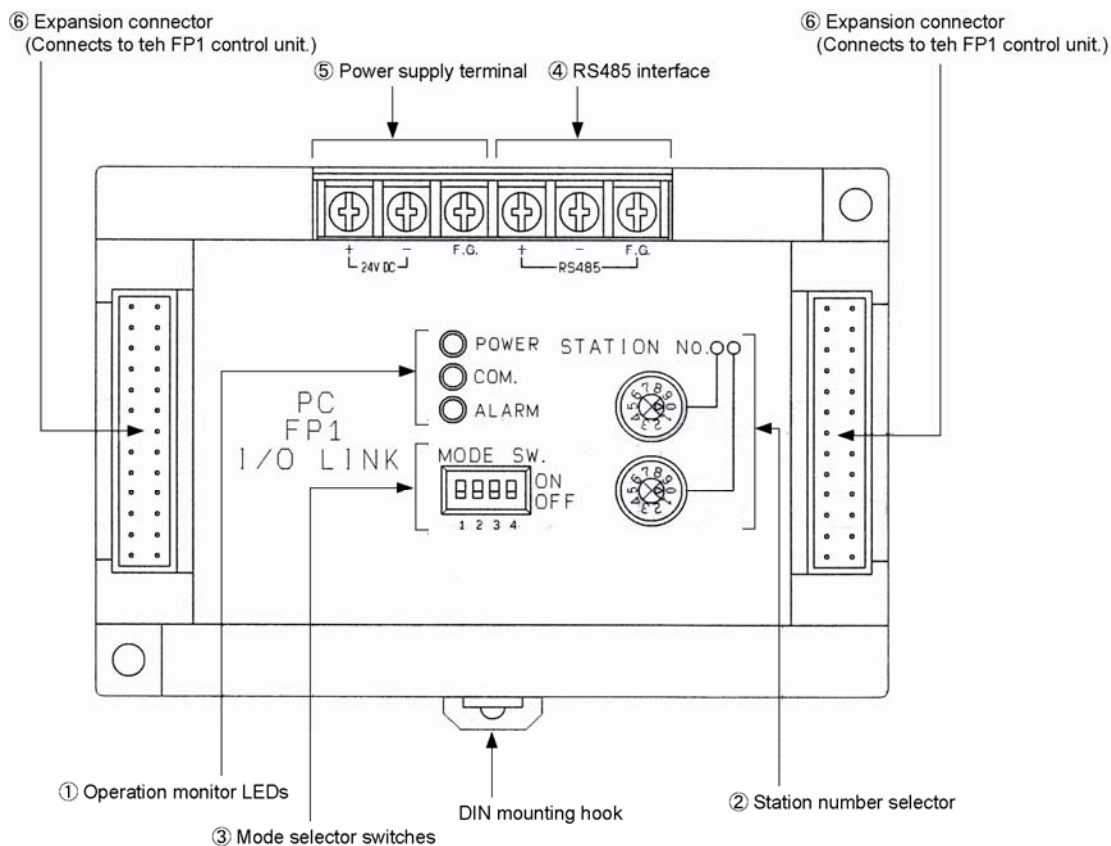
Reference: For information on the I/O numbers, <Chapter 6 Remote I/O Map> <11.6 I/O Allocation>



Note:

The I/O of FP1 is not controlled as slave station I/O by the CPU on the master station of FP2/FP2SH/FP3/FP10SH.

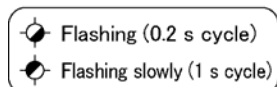
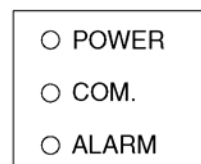
11.3 Part Names and Functions



Functions of each part

① Operation monitor LEDs

Indicates communication status and operation mode.



LED	Descriptions
POWER (Power supply)	<ul style="list-style-type: none"> ○ When power is supplied ● When power is not supplied
COM . (Communication)	<ul style="list-style-type: none"> ○ (ON): Not communicating ○ (Flashing): Communicating (Normal) ○ (Flashing slowly): Communicating (Stop mode) ● (OFF): Abnormal condition
ALARM (Alarm)	<ul style="list-style-type: none"> ○ (ON): Unit error ○ (Flashing): Station No. setting error ● (OFF): Normal unit

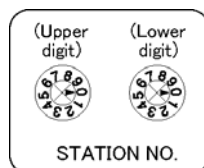
② Station number selector switches

Set the slave station number of the MEWNET-F. Point the arrow to the number to be used. (Set tens place and ones place separately.)

Setting range: 01 to 32

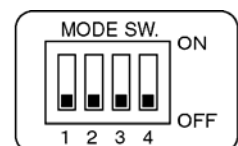
* When setting numbers exceeding the range, the setup error occurs (ALARM LED flashes), and communication becomes impossible.

* The settings will be accepted when the power turns on.



③ Mode selector switches

Sets the terminal station and the output mode a communication error occurs.



This figure is the example when the switches are all set to the OFF position.

SW	Setting	OFF	ON
1, 2	Terminal station setting	Not a terminal station	Terminal station
3	Output condition during a communication error	Output off	Maintains its output condition

* The output when a communication error occurred is the output Y on the FP2/FP2SH/FP3/FP10SH. The input X corresponds on the FP1.

* The settings of SW1 and SW2 should be the same.

* The switches are all set to the OFF position at the factory. SW4 is not used.

* The settings will be accepted when the power turns on.

④ RS485 interface

Terminal for connecting with the remote master station of FP2/FP2SH/FP3/FP10SH. A transmission cable (2-wire cable) is connected.

⑤ Power supply terminals

Supply the power to activate the I/O link unit. The AC power supply type (AFP1736) and the DC power supply type (AFP1732) are available.

⑥ Expansion connector

Connector for connecting to a FP1 control unit or FP1 expansion unit. For connecting the expansion cables (refer to the table below).

* A 7 cm long cable is attached to an I/O link unit as a standard accessory.

Name	Cable length	Product No.	Description
FP1 Expansion cable	7 cm	AFP15101	Standard accessory for AFP1732 and AFP1736
	30 cm	AFP15103	
	50 cm	AFP15105	

11.4 Specifications

11.4.1 General Specifications

Type	Consumption current	Weight	Power supply voltage	Product No.
FP1 I/O Link Unit [DC Power Supply Type]	0.1 A or less ^{Note1)}	Approx. 230g	20.4 V DC to 26.4 V DC	AFP1732
FP1 I/O Link Unit [AC Power Supply Type]	0.08 A or less (When using 100 V) 0.06 A or less (When using 200 V) ^{Note2)}	Approx. 380g	85 V AC to 264 V AC	AFP1736

Note1) When connecting an expansion unit that has no power supply after an I/O link unit, the consumption current is 0.2 A or less.

Note2) When connecting an expansion unit that has no power supply after an I/O link unit, the consumption current is 0.12 A or less (when using 100 V)/0.08 A or less (when using 200 V).

11.4.2 Performance Specifications

Item	Specifications
No. of slots used by I/O link unit	1 slot
No. of I/O points occupied by I/O link unit	64 points (Input: 32 points + Output: 32 point) ^{Note1)}
Allocation using remote I/O map	32X32Y

Note1) On the FP1, the input X70 to X8F and the output Y70 to Y8F are used (fixed).



Reference: <Chapter3 Unit Specifications>

11.5 Connection, Setting and Installation

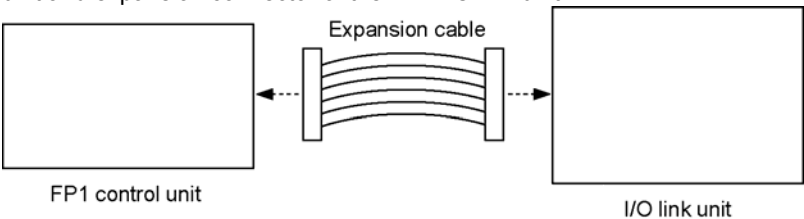
The FP1 I/O link unit is the interface to connect an FP1 and FP2/FP2SH/FP3/FP10SH.
Connect with the FP1.

The procedure to connect the I/O link unit is as follows.

Be sure to connect or remove the transmission cable or expansion cable to the I/O link unit only when all power is OFF.

11.5.1 Connecting to FP1

With an FP1 expansion cable (flat cable), you can connect the expansion connector of the FP1 control unit and expansion connector of the FP1 I/O link unit.



- Only one I/O link unit can be connected to one FP1 control unit.
- An FP1 expansion unit can be connected after an I/O link unit. An I/O link unit can be connected after an FP1 expansion unit. The number of connectable expansion units is the same regardless of whether the I/O link unit is connected or not.

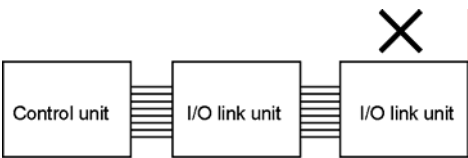
FP1 type	No. of connectable expansion units
16-point type Control unit	Max. 1 unit
24-point type Control unit	Max. 2 units
40-point type Control unit	Max. 2 units

* There is no restriction on the connected FP1 expansion unit.



Note:

The connection as below is not possible.



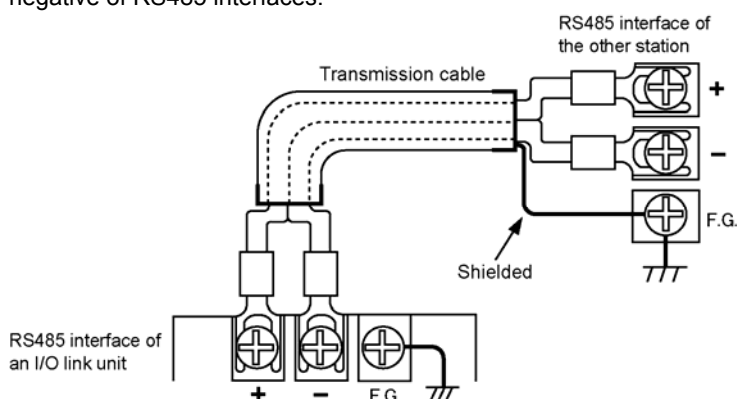
More than 1 unit cannot be connected.

11.5.2 Wiring to FP2/FP2SH/FP3/FP10SH

Connect the RS485 interfaces on the I/O link unit and on the other station of the FP2/FP2SH/FP3/FP10SH remote I/O system [MEWNT-F] with a 2-conductor cable (VCTF0.75 mm² x 2C (JIS).

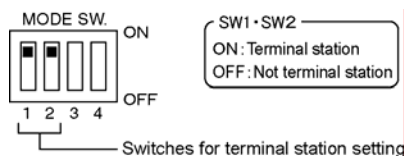
Connects to the FP2/FP2SH/FP3/FP10SH system via [MEWNET-F].

When connecting the transmission cable, be sure to connect positive (+) to positive, and negative (-) to negative of RS485 interfaces.



* Connect one end of the shielded line of the transmission cable to the F.G. terminal, and ground it.

- Set the appropriate I/O link units in the transmission line of [MEWNET-F] as the terminal stations with the mode selector switches SW1 & SW2.



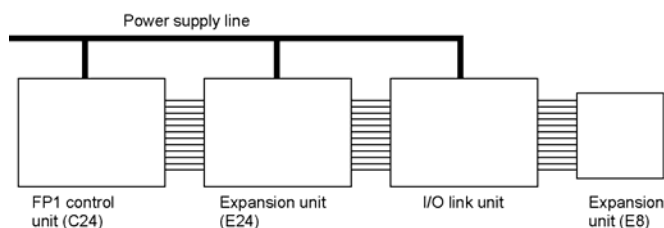
Reference:

For information on the transmission cable specifications, <3.4 Transmission Cable Specifications>

For information on the connection of transmission cables and the setting of terminal station, <Chapter 5 Connection for the Remote I/O System>

11.5.3 Wiring of Power Supply

Supply power to the control unit, expansion unit, I/O link unit from the same power source so that power ON and OFF for all units can be performed at the same time.



Note:

Do not supply power to the DC power supply type unit from the terminal that supplies power for the input of the FP1 control unit or expansion unit.

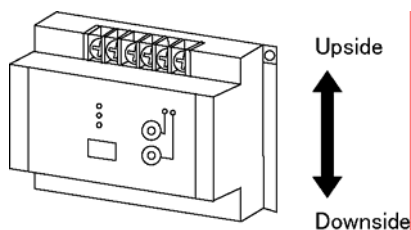
11.5.4 Installing to I/O Link Unit

- To install a unit on DIN rails, use the DIN rail mounting lever which is attached to the mounting plate of I/O link unit.



Note:

- Avoid using rail mounting in locations with severe vibrations and shock. Mount directly to the panel with screws.
- Do not perform unusual installation the such as ceiling mounting. The direction of this unit installed is as shown below.

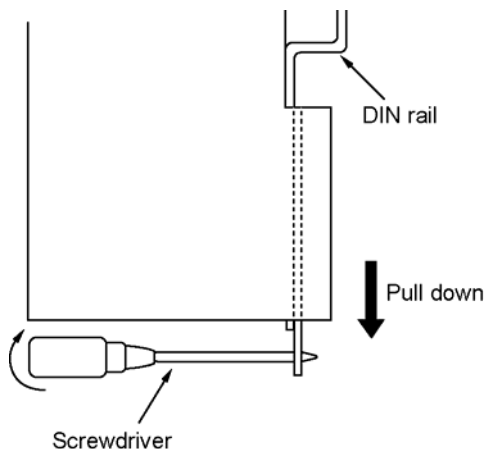


Installation

Align it with the mounting rail groove and push it down to install it.

Removal

To detach a unit from the DIN rail, pull the hook down with a slotted screwdriver.

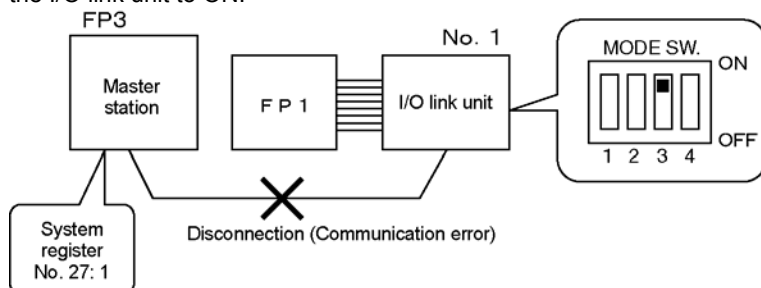


Reference: For information on the mounting hole dimensions, <Chapter 10 Dimensions>

11.5.5 Selecting Operation Mode

If the I/O link unit cannot communicate with the master station because of errors such as the disconnection of transmission cable, the output status of slave stations can be maintained. If a slave station is outputting data when an error occurs, the unit continues outputting data.

For maintaining the output when a communication error occurs, set the mode selector switch SW3 on the I/O link unit to ON.



For example) Y660 on FP2/FP2SH/FP3/FP10SH:
If cable disconnection occurs while it is ON, X70 on FP1 will remain to be ON.

When the mode selector switch Sw is OFF (SW3:OFF), data output (input of FP1) will stop after about 2 seconds when a communication error occurs.

11.6 I/O Allocation

This section describes the I/O numbers to be used for the "I/O link".How I/O numbers should be allocated will depend on whether you are using the FP1 or FP2/FP2SH/FP3/FP10SH.

On the FP1, I/O number allocated for the I/O link unit is fixed, however, on the FP2/FP2SH/FP3/FP10SH, it will vary depending on the connection and setting.

11.6.1 I/O Allocation for FP1

On the FP1, the special area for the I/O link is used.As the I/O numbers are fixed, the location of the I/O link unit and the I/O points used by the FP1 do not affect the allocation of the FP1.

<Special I/O for FP1 I/O link>

I/O type	I/O No.	Description
Input relay	X70 to X8F (32 points)	When the corresponding output Y in the FP2/FP2SH/FP3/FP10SH is turned ON, X70 to X8F will go ON.
Output relay	Y70 to Y8F (32 points)	When the Y70 to Y8F is turned ON, the corresponding input X in the FP2/FP2SH/FP3/FP10SH will go ON.

11.6.2 I/O Allocation for FP2/FP2SH/FP3/FP10SH

On the FP2/FP2SH/FP3/FP10SH, it is treated as remote I/O.I/O numbers will vary depending on the location of the master units (master 1 to 4) and the station numbers for the slave stations of I/O link unit. This section describes the number of I/O points of I/O link unit and the allocation.

No. of I/O points

Occupies 32 input points and 32 output points.

- I/O numbers are first allocated for the input, then for the output.

- When using the "Allocate Remote I/O Map" function of the tool software FPWIN GR, specify "32X32Y".

Allocation example

Communication path: Master 1 (the closest master unit to the CPU)

Base word number: 64 (default value)

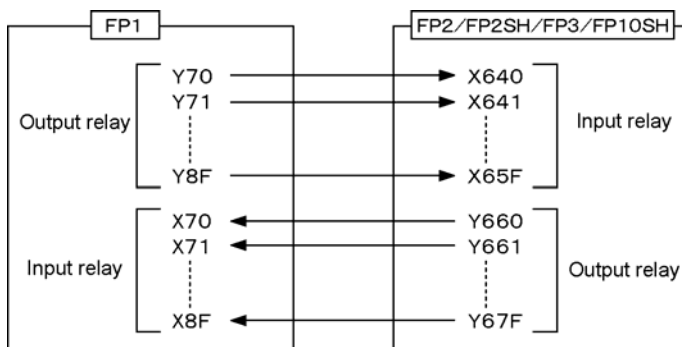
I/O link unit station number: No. 1

In the above situations, I/O numbers are allocated as follows.

X640 to X65F (32 input points)

Y660 to Y67F (32 output points)

Each I/O relay corresponds as follows:



Reference: For information on the remote I/O allocation, <Chapter 6 Remote I/O Map>

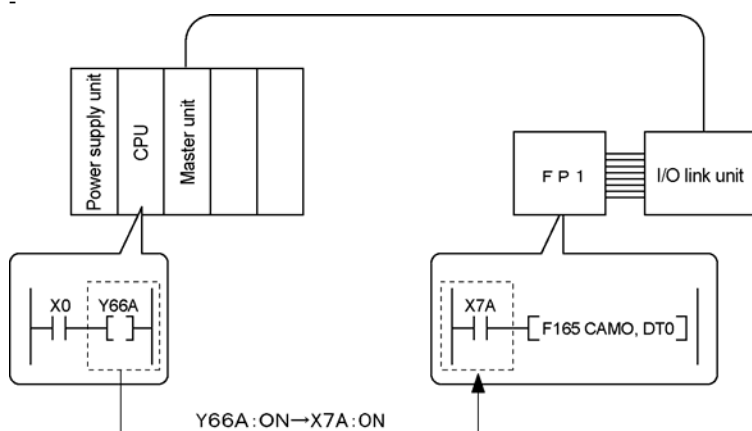
11.7 Usage Examples

"I/O link" usage examples are shown below.

1. Using a program in the FP2/FP2SH/FP3/FP10SH, turns ON/OFF the input relay of the FP1.

Example of executing "Cam control instruction" (F165) on the FP1 using a program in the FP2/FP2SH/FP3/FP10SH

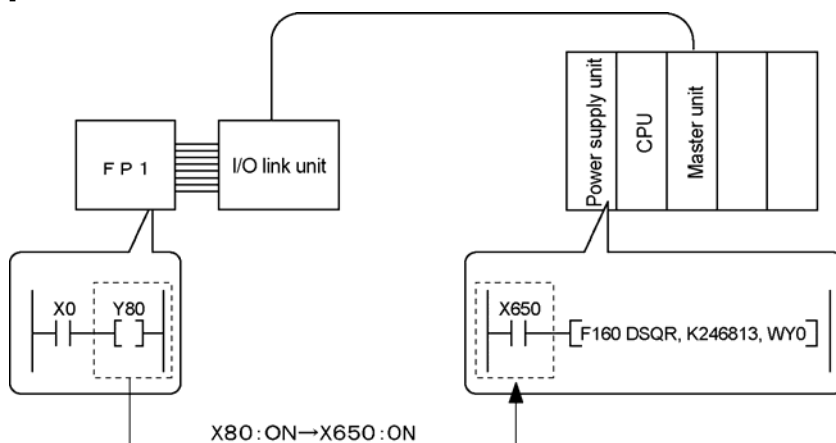
- It is necessary to program on the FP1.
- Turn on the corresponding Y relay of the FP2/FP2SH/FP3/FP10SH to turn on the input relay (for the I/O link) of the FP1.



2. Using a program in the FP1, turns ON/OFF the input relay of the FP2/FP2SH/FP3/FP10SH.

Example of executing "32-bit data square root" (F160) on the FP2/FP2SH/FP3/FP10SH using a program in the FP1

- It is necessary to program on the FP2/FP2SH/FP3/FP10SH.
- Turn on the corresponding Y relay of the FP1 to turn on the input relay (for the I/O link) of the FP2/FP2SH/FP3/FP10SH.



3. Exchange I/O information between FP1 programmable controllers on the MEWNET-F network

- I/O information cannot be exchanged directly between the FP1 programmable controllers connected to the [MEWNET-F].
- When I/O information is exchanged between FP1 programmable controllers, the program in the CPU of the master station system is used.

In the example below, if the execution condition is met on the FP1 which is the slave station number 1, an instruction will be executed on the FP1 and also the FP1 which is the slave station number 2.

The execution condition on the FP1 (No. 1): ON → Execute an instruction on the I/O link unit No. 1.



Turn ON the Y relay for the I/O link.



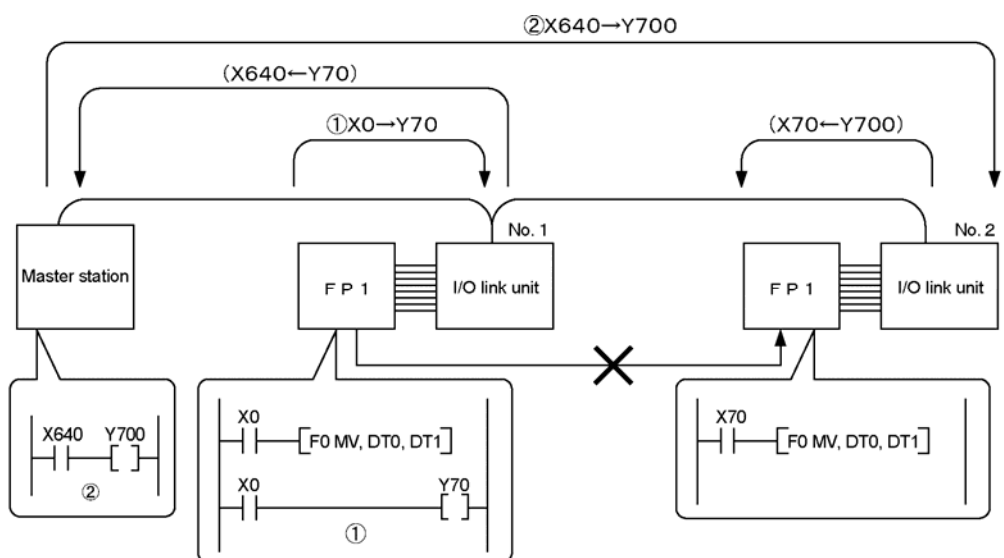
X relay of the master station FP2/FP2SH/FP3/FP10SH: ON



Turn ON the Y relay corresponding to the I/O link unit No. 2.



X relay for the I/O link of the FP1 (No. 2) → Execute an instruction on the I/O link unit No. 2.



11.7.1 When "MEWNET-F" Communication Error Occurs with I/O Link Unit

If data cannot be transmitted between the I/O link unit and the master unit of FP2/FP2SH/FP3/FP10SH due to any cause such as the disconnection of transmission cable (a communication error occurs), the I/O link unit will operate as follows.

1. I/O operation

Mode selector switch	I/O operation
SW3: ON	Maintains the output on FP2/FP2SH/FP3/FP10SH. → Maintains the input relay on FP1.
SW3: OFF	Turns OFF the output on FP2/FP2SH/FP3/FP10SH. → Turns OFF the input relay on FP1.

2. LED indication

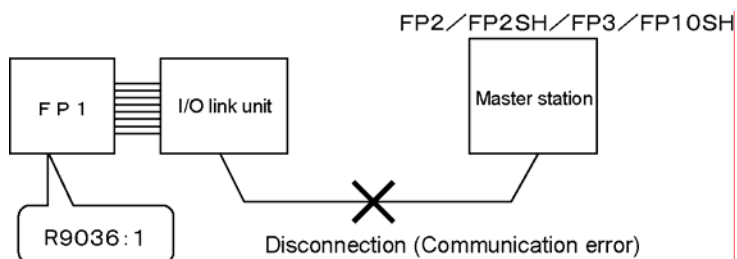
COM. LED: ●(OFF)

3. I/O link error flag of FP1 (R9036)

The occurrence of a communication error can be checked on the FP1 by monitoring the I/O link error flag R9036.

Special relay name	Status
R9036	0: Normal end 1: Communication error occurs

However, if a communication error occurs in another station, and when the mode selector switch "SW7" on the master unit is ON, it will not be activated. It will be activated only when the switch "SW7" is OFF.



Reference: For the information on the steps to take when a communication error occurs, <7.2.1 Operation Status When a Communication Error Occurs>

11.8 Precautions When Using I/O Link Unit

Be sure to take the following notes for using the I/O link unit.

- (1) Be sure to connect transmission cables and expansion cables with all power OFF.
- (2) Pay attention not to allow pieces of wire or other objects to fall into the unit when making wiring connections.
- (3) Do not directly touch the terminal of expansion connector on a unit with bare hands. It may cause damage to the devices because of static electricity.
- (4) Do not drop the I/O link unit and do not apply excessive force to the unit.
- (5) The unit should only be used within the specified ratings.
 - * The usage environment is the same as the other [MEWNET-F] components.
- (6) The system should be used in a place where it will not be influenced from power transmission lines, high voltage equipment, power cables, power equipment, hum and surge generating equipment.
- (7) When installing the power supply line and communication line, wire them in separate ducts, or maintain a clearance between those lines.
- (8) If any one of product numbers, AFP3740, AFP87441, AFP87442 and AFP3741 is used in the network, the transmission distance will be shorten as shown in the table below.

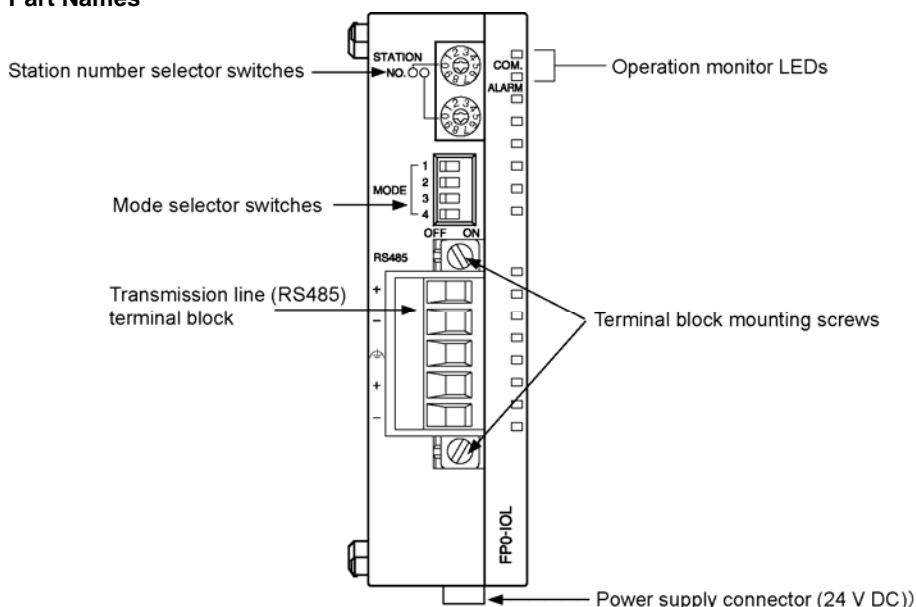
Cable type	Product No.	Max. transmission distance (Total length)	
		When they are not used	When any one of them is used
Twisted pair	Hitachi Cable, KPEV-S1.25 mm ² x 1P Belden 9860	700 m	300 m
	Hitachi Cable, KPEV-S 0.5 mm ² x 1P Belden 9207	600 m	300 m
VCTF	VCTF 0.75 mm ² x 2C	400 m	200 m

Chapter 12

(Appendix 2) I/O Link With FP0

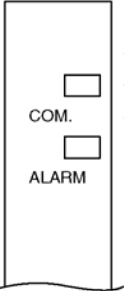
12.1 Part Names and Functions

Part Names

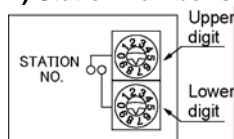


Display part and Setting part

1) Operation monitor LEDs

 <div><p>◐ : ON</p><p>◑ : Flashing (5 times/sec.)</p><p>◒ : Flashing (1 time/sec.)</p><p>● : OFF</p></div>	COM. (Green)	Displays communication status. ◐ : Not communicating ◑ : Communicating (Normal) ◒ : Communicating (Stop mode) ● : Abnormal condition
	ALARM (Red)	Displays unit error status. ◐ : Unit error ◑ : Station No. setting error ● : Normal unit

2) Station number selector switches



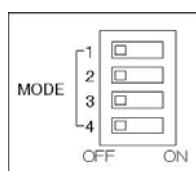
Sets the station number for the I/O link unit.

The usable range is 01 to 32.

When setting numbers exceeding the range, the setup error occurs, and communication becomes impossible.

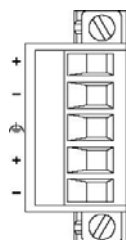
* Setup error: The ALARM LED blinks.

3) Mode selector switch



SW No.	Function	OFF	ON
1	Configuring a terminal station	Not terminal station	Terminal station
2			
3	Output condition during a communication error	Output off	Maintains its output condition
4	I/O link error flag	Not available	Available

4) Terminal block pin layout



Each (+) and (-) terminal is connected internally.
(When doing the crossover wiring, connect one cable to the upper (+) and (-) terminals, and connect the other cable to the lower (+) and (-) terminals.)

12.2 Specifications

Name	No. of I/O points	Part No.	Product No.
FP0 I/O Link Unit	64 points(32 input points, 32 output points) [63 points(31 input points, 32 output points)]	FP0-IOL	AFP0732

12.2.1 General Specifications

Item	Specifications
Rated voltage	24 V DC
Power supply voltage range	21.6 to 26.4 V DC
Rated consumption current	I/O link unit 40 mA or less/24 V DC
	Control unit increment 30 mA or less/24 V DC
Weight	Approx. 85 g



Reference: <Chapter3 Unit Specifications>

12.3 I/O Allocation

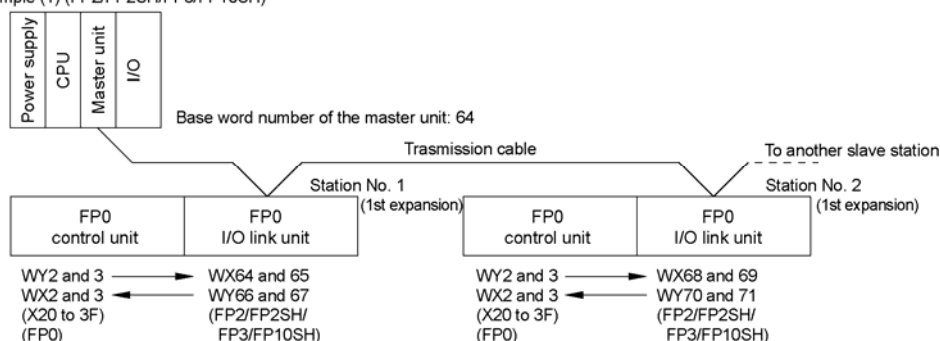
Item	Specifications
No. of I/O points per one I/O link unit	64 points ^{Note1)} (32 input points & 32 output points)
Remote I/O map allocation	32X/32Y

Note1) When setting the output of the I/O link error flag to ON (available), it is 63 points (31 input points & 32 input points).

12.3.1 I/O Numbers

The example below shows a remote I/O system which one I/O link unit is connected to a FP0 control unit.(When the I/O link error flag is off (unavailable))

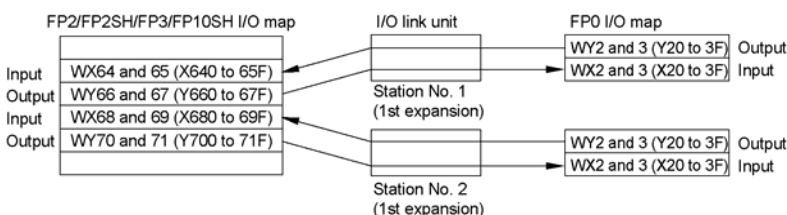
Example (1) (FP2/FP2SH/FP3/FP10SH)



The I/O link unit is recognized as a slave station with 64 I/O points (32 input points & 32 output points (32X/32Y)) by the master unit of FP2/FP2SH/FP3/FP10SH. Therefore, the I/O number of the I/O link unit from the FP2/FP2SH/FP3/FP10SH is determined by the base word number of the master unit connected to the I/O link unit and the station number of the I/O link unit.

Also, in the remote I/O map, input is allocated first. In the above example, when connecting the I/O link unit with the station number 1 to the master unit with the base word number 64, the I/O link area is WX64 and 65 (X640 to 65F) for input, and WY66 and 67 (Y660 to 67F) for output from the FP2/FP2SH/FP3/FP10SH. Also, when connecting the I/O link unit with the station number 2 as above, the I/O link area is WX68 and 69 (X680 to 69F) for input, and WY70 and 71 (Y700 to 71F) for output from the FP2/FP2SH/FP3/FP10SH.

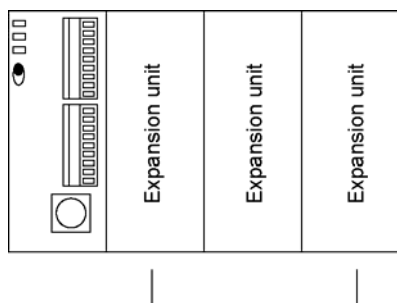
The I/O numbers of the I/O link unit from the FP0 will vary depending on the installed position.



For example, if Y20 of the FP0 with the station number 1 is turned ON, X640 of the FP2/FP2SH/FP3/FP10SH will be ON. If Y660 of the FP2/FP2SH/FP3/FP10SH is turned ON, X20 of the FP0 with the station number 1 will be ON. Similarly, if Y20 of the FP0 with the station number 2 is turned ON, X680 of the FP2/FP2SH/FP3/FP10SH will be ON, and if Y700 of the FP2/FP2SH/FP3/FP10SH is turned ON, X20 of the FP0 with the slave station number 2 will be ON. As above, the I/O link unit is able to exchange the I/O information between the FP2/FP2SH/FP3/FP10SH and FP0.

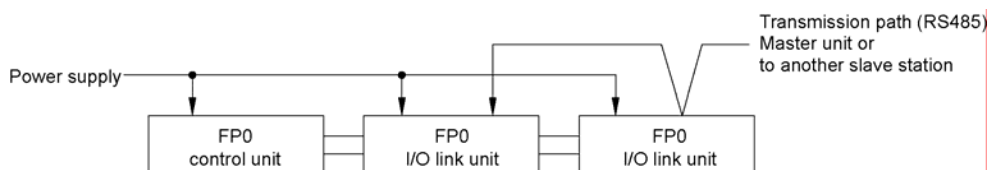
12.4 System Configuration

FP0 Control unit



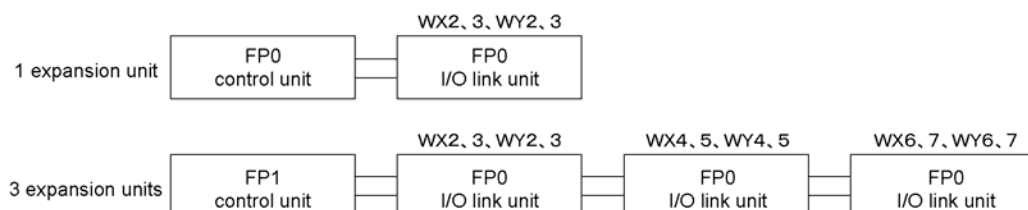
Up to 3 units including I/O link units and other expansion units can be connected to a control unit.

12.5 Connections



As for the connection of I/O link units with a control unit, the units can be added side by side as well as expansion units.

Up to 3 I/O link units can be connected to a control unit.



12.6 Remote I/O System Communication Error Flag (FP0) [Input Highest-order Bit, 32th Bit]

The communication state of the remote I/O system can be checked on the FP0.

This function is available when the mode selector switch 4 is ON.

Communication state	Normal state	Abnormal state
I/O link error flag	0	1

Note1) This flag shows the communication state between this I/O link unit and the master unit. If a communication error occurs in a slave station, this flag will go ON only when the mode selector switch No. 7 of the master unit has been set to "0".

Note2) This flag is allocated to the last 1 bit X (n+1)F among the input of 2 words (XWn, n+1) that is allocated to this I/O link unit.



Reference: <12.3.1 I/O Numbers>

Record of changes

Manual No.	Date	Desceiption of changes
FAF-35E-1	Mar.2008	1 st edition (ACG-M0028-1,FAF-35-13)
FAF-35E-2	Oct.2008	2 nd edition - Change of Company name
FAF-35E-3	Feb.2009	3 rd edition
FAF-35E-4	Mar.2010	4 th edition
FAF-35E-5	Aug.2011	5 th edition - Change of Company name
FAF-35E-6	Jul.2013	6 th edition - Change of Company name

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